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## PENICILLIN AGAR PASTILLES

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MACGREGOR AND LONG<sup>1</sup> have described a method for the treatment of surface infections of the mouth with penicillin. In order to maintain an adequate concentration in the saliva they incorporated the penicillin in a pastille made of gelatin.<sup>2</sup> On the average, the gelatin pastilles were found to dissolve in the mouth in three-quarters of an hour. When a pastille containing 500 units of penicillin was removed from the buccal sulcus after 15 minutes, subsequent estimations of salivary penicillin showed fair quantities persisting 15 minutes later and small quantities even after 30 minutes. They demonstrated that this form of therapy produced striking changes in the bacterial flora of the mouth. For example, in cases of acute ulcerative gingivostomatitis (Vincent's type) spirochaetes could not be found in smears made 24 hours after treatment with penicillin pastilles was begun and fusiform bacilli disappeared within 72 hours.

Following the publication of MacGregor and Long's article experiments were performed to determine the number of units of penicillin obtained per c.c. of saliva when pastilles of various kinds containing different amounts of penicillin were placed in the buccal sulcus. Since gelatin pastilles dissolve in the mouth in one-half to one hour, other less soluble bases were studied. The ideal base would appear to be one which is insoluble and yet will deliver into the saliva the penicillin contained in the pastille at a fairly uniform rate. A pastille of this type would decrease the number used each day and hence the total amount of penicillin required for treatment. Agar appeared to be the sub-

stance most likely to provide these conditions. Solid agar gel is insoluble in water and diffusion of penicillin through it is uniform but not too rapid as evidenced by the fact that assays for penicillin are conducted on agar plates.

When a circular agar pastille (13 mm. in diameter and 5 mm. thick) is placed in the buccal sulcus and care is taken not to chew or disrupt it the pastille disintegrates very slowly and fragments remain in the sulcus for 4 to 5 hours or longer. Gelatin pastilles on the other hand dissolve comparatively rapidly and in our experience the addition of gum tragacanth did not lengthen the time required for the pastille to dissolve. Pastilles composed of agar and gelatin did not persist in the mouth any longer than those of gelatin alone. This apparently was due to the gelatin dissolving and leaving fine fragments of agar which were carried away in the saliva. Consequently the results to be reported will deal only with agar pastilles. Limited data on gelatin pastilles are given for comparison.

### I. METHOD OF PREPARATION OF AGAR PASTILLES

To 200 c.c. of distilled water in a flask is added 8 gm. of agar. If the pastilles are to be stored for several weeks butoben\* may be added to prevent mould growth. Autoclave for 30 minutes to dissolve the agar and while still hot filter through non-absorbent cotton. Collect the filtered agar in a flask and place in a water bath at 50 to 55° C. When the agar has cooled to about 50° C. add the desired quantity of penicillin solution. Mix thoroughly and make into pastilles 5 mm. thick. The resulting pastilles have a diameter of 13 mm., weigh about 0.6 gm. and have a pH of 6.5.

A very simple method for making the pastilles is to pour the molten agar containing the penicillin into a perpendicular length of 16 mm. glass tubing, the lower end of which has been closed with a rubber stopper. A 4-foot length

\* Aided by a grant from the National Research Council, Ottawa.

\* n-Butyl ester of p-hydroxybenzoic acid; obtainable from Merck & Co. We have found it effective at a concentration of 1 in 1,000 although this may be higher than necessary since 1 in 5,000 is claimed to be satisfactory.

holds 150 c.c. After the agar has set firmly (3 to 4 hours) the stopper is removed and the column of agar can be readily extruded by elevating one end. The column of agar will not run out of the tube until completely jelled. The agar column is then cut into slices 0.5 cm. thick. This may be done by hand, using multiple knives (razor blades mounted in a handle or even in plaster of Paris) or wires strung on a frame (as found in a household hard-boiled egg cutter). When large numbers of pastilles were required we developed a simple but accurate cutting device. This utilizes the mechanical parts of a freezing microtome. The glass tube containing the column of agar is mounted vertically above the microtome so that the extruding agar rests upon the base. The cutting blade is set 0.5 cm. above the base and the automatic raising mechanism is disconnected. The usual wedge-shaped microtome knife is unsatisfactory but if it is replaced by a safety razor blade attached to the cutting arm the pastilles are cut without any deformation or disintegration. A projecting piece of metal, mounted below the blade and about 15 mm. behind the cutting edge, serves to push the cut pastille off the platform as the knife comes through on to a sloping trough from which it falls into a sterile tube or vial. With this device one operator can make about 1,200 pastilles per hour. Each vial contains from 10 to 20 pastilles and has a screw-cap or other impervious stopper to prevent drying of the agar.

It may be noted that gelatin pastilles cannot be made in this way since the jelly adheres firmly to the glass and will not slide down as does the agar.

## II. STUDIES

### (a) *Stability of penicillin solution to heat.*—

The deterioration of penicillin in aqueous solution by heat was studied in order to determine if the temperatures to which it would be subjected during the preparation of pastilles causes a loss of potency. Although Fleming<sup>3</sup> found that crude penicillin filtrates could be boiled for a few minutes without loss of activity it is possible that purified preparations might not be as stable; indeed it is a general belief that temperatures above 37° C. cause a fairly rapid loss in potency. An aqueous solution of sodium penicillin\* containing about 1,100 units per c.c. was placed in a water bath at 56° C. and assays

were done from time to time. The following results were obtained:

Control assay .....	1,100	units	per	c.c.
After 2 hours at 56° C. ....	1,100	"	"	"
4 hours at 56° C. ....	1,100	"	"	"
6 hours at 56° C. ....	900	"	"	"
24 hours at 56° C. ....	500	"	"	"
48 hours at 56° C. ....	50	"	"	"

From these results it can be seen that there is no appreciable deterioration at 56° C. up to 4 hours, which provides ample time for the preparation of pastilles without any loss of potency.

### (b) *Stability of penicillin in agar pastilles.*—

Assays of the pastilles were conducted by disintegrating them by squeezing through fine wire gauze. The wire gauze was washed with buffer (pH 7.0) and the minute agar particles were extracted for 1 hour with the same solution before appropriate dilutions were made for assay by the cylinder-agar plate method. This procedure gave fairly accurate results as the initial values found correlated quite well with the theoretical values per pastille.

Sufficient time has not, as yet, elapsed for the completion of this study but the results indicate that the penicillin is quite stable in the agar pastilles. In pastilles containing 400 units stored at room temperature there was no loss up to 10 days; after 20 days about 50% of the expected value was found. Storage in the refrigerator has shown that no deterioration occurs up to 8 weeks.

(c) *Diffusion of penicillin from agar.*—The diffusion of penicillin from agar was investigated by placing a pastille in 1 c.c. of phosphate buffer (pH 7.0) at room temperature. At the end of an hour the pastille was removed and transferred to a similar quantity of fresh buffer. The amount of penicillin which had diffused from the agar into the aqueous solution during that time was determined. This procedure of passing the same pastille through successive changes of buffer solution was continued for 4 hours. Following the last aqueous extraction the quantity of penicillin remaining in the pastille was assayed. The results of a typical experiment are given below:

Penicillin in agar pastille .....	200	units
Diffusion during 1st hour .....	75	"
" " 2nd hour .....	40	"
" " 3rd and 4th hours .....	35	"
Total diffused .....	150	"
Remaining in pastille at 4 hours .....	58	"
Total amount recovered .....	208	"

\* Chas. Pfizer & Co. (520 units per mgm.).



Although the conditions under which these tests were done do not exactly duplicate those in the mouth where there is a continuous though variable secretion of saliva and where fragmentation of the pastille does eventually occur, it seemed reasonable to assume that satisfactory concentrations of penicillin could be achieved and maintained in the saliva by the use of single agar pastilles.

(d) *Salivary concentrations from agar pastilles.*—Single pastilles of known potency were placed in the buccal sulcus. Samples of saliva were collected every half hour on which assays were done by the cylinder-agar plate method. From 3 to 5 normal people were used in each of these tests. While some variation was noted in the salivary concentrations produced in different individuals all the levels were of similar magnitude. The data listed in Table I are in all instances the average of observations on at least three subjects.

TABLE I.  
SALIVARY CONCENTRATIONS OF PENICILLIN FROM  
SINGLE AGAR PASTILLES

Time pastille in mouth	Units of penicillin per c.c. of saliva				
	Amount penicillin per pastille				
	75 units	150 units	300 units	600 units	800 units
½ hour	2.3	3.3	6.0	9.0	18.0
1 hour	1.0	3.0	5.0	8.0	9.0
1½ hours	1.0	1.7	3.8	3.5	9.0
2 hours	0.75	0.8	2.1	1.5	7.0
2½ hours	0.5	0.4	0.7	1.3	5.5
3 hours	0.3	0.4	0.6	1.2	3.5
3½ hours	0.3	0.3	0.5	0.7	2.2
4 hours	0.3	0.3	0.3	0.5	1.4
Penicillin remaining in pastille at 4 hours	6 units	5 units	10 units	11 units	56 units

As will be seen in Table I a single pastille containing 75 units of penicillin sufficed to maintain a concentration of at least 0.3 units per c.c. of saliva over a period of 4 hours. This concentration is about 15 times that required to completely inhibit the growth of staphylococci in broth. Some penicillin still remained in the fragments of the pastille at the end of 4 hours. When the pastilles contained larger amounts of penicillin the salivary concentration was raised and very high values were found during the first 2 hours. It is clear from Table I that agar pastilles serve as an excellent means of delivering to the saliva a continuous supply of penicillin

which maintains a bacteriostatic concentration in the mouth for at least 4 hours.

The superiority of agar pastilles over those made from gelatin is mainly due to the greater persistence of the former. The gelatin pastilles made here according to Martin's<sup>2</sup> description have rarely remained in the mouth for as long as one hour. Penicillin concentrations in the saliva resulting from single gelatin pastilles (300 units) were high during the first 15 minutes (10 to 20 units) but fell rapidly, being 2 to 10 units at 30 minutes, 0.5 to 2.0 units at one hour and undetectable at 2 hours.

It may be of interest to mention that only very small quantities of penicillin could be detected in the urine when agar pastilles were held between the cheek and the gums. For example, the highest urinary concentration of penicillin achieved in a 4 hour period during which a 10,000 unit agar pastille was held in the mouth was 0.4 units per c.c.

### III. CLINICAL APPLICATIONS

In the clinical use of agar pastilles, patients are instructed to place the pastille between the cheek and the gum. They are told not to chew, suck or disintegrate the pastille with the tongue. If these instructions are followed the pastille will persist for 4 hours or more. Every 4 hours the remnants of the pastille are removed from the mouth and replaced by a fresh pastille. A pastille is placed in the mouth on retiring and is replenished if the patient wakes during the night.

Agar penicillin pastilles have been used in the treatment of fuso-spirochætal infection of the mouth (Vincent's type). In all instances rapid elimination of the infecting organisms occurred together with prompt alleviation of clinical symptoms and signs. Usually the clinical improvement was apparent within 24 hours. This may be illustrated by the following case history:

Patient gave a three-day history of painful gums and glands on the right side of the face. On examination both the upper and lower gums on the right side were covered with a greyish green slough and the lymph glands under the jaw were palpable and moderately tender. The breath had a foul odour. Smears made from the necrotic areas of the gums showed large numbers of spirochaetes and fusiform bacilli. Nine hours after continuous treatment with a penicillin agar pastille, changed every 4 hours, the pain and tenderness had subsided significantly. The following morning the breath was free of odour, no membrane remained and the sole sign of infection was hyperæmia of the gums at the previously involved sites. By the next morning the gums

appeared normal and smears were negative for spirochaetes and fusiform bacilli. Duration of pastille treatment was two and a half days.

Studies are also in progress on the value of pastille therapy in hæmolytic streptococcal infections of the throat and in carriers of hæmolytic streptococci. The preliminary results have not been invariably good and final evaluation must await the completion of more extensive investigations.

Of interest also was the question as to whether or not penicillin would diffuse from the saliva into the contents of pyorrhæal pockets in amounts sufficient to affect the bacterial flora. Studies on a few patients have demonstrated that after 2 or 3 days of continuous pastille therapy marked changes occurred in the flora of such pockets. Smears of the contents made prior to treatment showed large numbers of spirochaetes and fusiform bacilli. During each day of pastille treatment a reduction in the number of these micro-organisms and also of streptococci was noted until, in most instances, by the third day none, or at most only a few, could be found. The depth of the pockets investigated varied from 2 to 7 mm. These changes, which occurred earlier in the shallow pockets, were accompanied by clinical improvement in the appearance of the gums. The possible value of these observations in dentistry is being explored further.

Other possible uses of agar containing penicillin are as vaginal suppositories to combat penicillin-sensitive infections secondary to carcinoma of the cervix and as packs in the treatment of infected wounds or burns. The use of such preparations is under investigation.

#### SUMMARY

A simple method is described for the preparation of penicillin pastilles using agar as a base.

Agar pastilles possess some characteristics which make them superior to those composed of gelatin. They persist in the mouth for at least 4 hours (as contrasted with one-half to one hour for gelatin pastilles) during which time a bacteriostatic concentration of penicillin is maintained in the saliva. The number of pastilles and the quantity of penicillin required each day is thus considerably reduced. Furthermore, the physical characteristics of agar gels permit the use of methods for the making of pastilles which can be carried out in any bacteriological laboratory and which are simpler

than those required in the preparation of gelatin pastilles.

Data are presented on the diffusion of penicillin from agar and on salivary concentrations following the use of agar pastilles containing various amounts of penicillin.

The excellent clinical results which have followed the use of penicillin pastilles in Vincent's fusio-spirochætal infection of the mouth indicate that they provide the best form of therapy known at the present time for this condition.

Evidence is presented that some diffusion of penicillin from saliva into pyorrhæal pockets occurs. However, further study is required to determine the value of penicillin pastille therapy in dental conditions.

Other possible uses for agar preparations containing penicillin are mentioned.

The authors would like to express their appreciation of the valuable technical assistance rendered by Miss Joan Hennessy and to thank Dr. Harold K. Box for his co-operation in the periodontal studies.

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### PSYCHONEUROTICS DISCHARGED FROM THE CANADIAN ARMY\*

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THE largest single group among medical discharges from the Canadian Army since the beginning of this war has been that of conditions classified as psychoneurosis. This group has amounted to 15% of all medical discharges. About another 15% is comprised of a variety of conditions described as psychiatric but which cannot as justifiably be considered as a single group. The next largest medical group is that of respiratory disorders which amount to 10% of all medical discharges. Various other medi-

\* From the Directorate of Medical Services N.D.H.Q. (Army), Ottawa.

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cal and surgical disabilities make up the balance of medical discharges with none of them individually mounting as high as 10% of the total.

In addition to those discharged on medical grounds because of psychoneurosis, a number almost as large (about 2/3) were partially disabled by psychoneurotic reactions and have been discharged on administrative grounds for reasons such as no suitable employment being available for them in the army.

These facts should give some perspective to the importance of psychoneurosis as a medical problem generally. The question immediately arises as to whether or not the civilian readjustment of these individuals will prove to be a serious problem. For this reason a grant was made by the National Research Council through the Associate Committee on Army Medical Research in order to obtain social service investigations of a sample of individuals who had been diagnosed as psychoneurotic and subsequently discharged to civilian life.

Since the Army was interested to see if any evidence was forthcoming to indicate that some of these individuals might have been able to render useful service if retained in the army, the investigations were carried out by army medical social workers as well as by civilian social workers under their direction. Liaison was also maintained with the Department of Veterans' Affairs.

#### SAMPLING OF CASES

It was not practicable to make a social service study of individuals over the whole of Canada, so names were obtained from machine records for cases discharged in three military districts in central Canada from January to October, 1943. This ensured that at least three months had elapsed between the time of discharge and the subsequent follow-up investigation. From a total of 1,650 names there were selected 740 whose intended places of residence on discharge were either in the cities of London, Windsor, Toronto, Hamilton, St. Catharines, Montreal and Verdun, or in the towns, villages and rural areas which are within a radius of about 50 miles from these cities. In two of the districts it was possible to contact about 80% of these cases, whereas in the third district the survey was terminated when about 50% of the cases had been followed-up. There were 560 cases in all.

The sampling included individuals of both French and English descent with a scattering of other European stock as well as Indian and Negro. A wide range of the economic and social scale was represented. There were 249 individuals from the area around Montreal, 254 persons from around Toronto, and 57 from around London and Windsor. There were 465 urban individuals, and 95 from towns (with a population under 25,000), villages and rural areas. This division produced a rural sample not very representative of a truly rural group but even on this basis significant differences seem evident in comparison with the "urban" cases. Data are not readily available on the urban-rural ratio in the Canadian Army altogether. However an analysis of an August, 1944, recruit sample showed it to be 63% "urban", the term in this case indicating incorporated cities, towns and villages of over 1,000 population. This is considerably lower than the greater than 83% of even more urban character which prevailed in our sample. The urban bias in this study was a result of the greater difficulty of social service investigation of rural cases as well as of the greater urbanization of the districts where the study was made. The area in which the sampling was made is probably also not representative of the whole of Canada in other characteristics bearing on the incidence and type of psychoneurosis as well as of other public health problems.

An estimate has been made of all psychoneurotics discharged from the Canadian Army, on both medical and administrative grounds, during this war up to September, 1944. This provided a figure of almost 22,000 cases. The group of 560 cases, then, might be considered a 2.5% sample of all such neurotics, with a recognition of the biases imposed by the particular time of discharge, the particular region of Canada covered, and the preponderance of urban cases. Effects of these biases can be judged to a certain extent by the district and urban and rural breakdowns which will be presented in some of the charts. In addition the district breakdowns may make possible some inferences in relation to the regional differences within the area of the study.

The sample included various diagnostic subgroups as follows: psychoneurosis, including anxiety state, neurasthenia or hypochondriasis, 379 cases; hysteria, 28 cases; reactive depression

or situational anxiety, 21 cases; temperamental instability, 78 cases; mixtures of these, 54 cases. These proportions were not dissimilar to those reported for the Canadian Army Overseas by Hyland and Richardson,<sup>1</sup> with certain exceptions, notably, that in the overseas series there were more cases of hysteria, and there were 5 cases of obsessive compulsive neurosis among 649 neurotics, whereas we omitted the latter condition from our series but included temperamental instability, which was classified by overseas authorities as belonging with psychopathic personality.

In our series there were 530 male soldiers and 30 C.W.A.C. Of the male personnel 51 had been overseas, 324 were general service volunteers who had never left Canada, and 155 were N.R.M.A. draftees. None of the C.W.A.C. had seen overseas service. Ages ranged from 18 to 49 with an average age of 28.3 years.

#### SOURCES AND NATURE OF INFORMATION

Sources of information included the discharged soldier, his parents, wife, siblings or other relative or close friend. Occasionally social agencies were used to whom the soldier and his family were known. The mother was the most common single source. The wife was the second most common and the soldier himself the third. In about 30% of cases, two or more sources were used. In all cases the information was checked with the information in the army documents. When comparisons were made of information received from various sources the information generally proved to be reliable.

The information sought dealt primarily with the health of the discharged soldier and his adjustment in civilian life with regard to his occupation, his home and the community. In order to evaluate this, information was collected regarding the soldier's pre-enlistment adjustment. Attention was paid to family patterns of mental illness, emotional instability and the so-called "psychosomatic" conditions. Information was obtained on the soldier's early childhood history, particularly with regard to neurotic features. This was followed through to adult life up to the time of enlistment, and his adjustment to the army. Finally the soldier's belief concerning the reason for his discharge was ascertained as well as the post-discharge history. Relationships were sought between these various factors as well as with length of service, area of

service, and the region to which the soldier had returned.

#### GENERAL FINDINGS

In 71% of cases the histories indicated instability prior to enlistment. This was evidenced by several childhood neurotic symptoms, an unstable work history or neurotic symptoms prior to enlistment. Often even the same symptoms as those presented at discharge were found to have antedated enlistment. This percentage is very similar to that reported previously for service psychoneurotics.<sup>2</sup> Of those who appeared not to have had significantly unstable histories before enlistment 10% seemed to have involved domestic factors not directly related to Army service. There were only 3 cases who had suffered actual battle exhaustion.\* Seventy-six per cent of all cases had been enlisted prior to systematic psychiatric screening of all recruits.

A broken home, that is, the loss of a parent or separation, divorce, or serious quarrelling in the home, before mid-adolescence, is usually considered to be a predisposing factor in psychiatric breakdown. In both the group of individuals who had seen service overseas and the one of those who had served in Canada, the incidence of such a history was only about 25%. In a random sampling of soldiers overseas previously made<sup>1</sup> it had been found that 20% came from broken homes. In that study the age of 16 years had been taken as the mid-adolescent age whereas in our study the age of 14 was chosen. It did not appear, then, that the broken home was an important factor in the cases in our study. Since there were so few cases of actual battle exhaustion it cannot be concluded that a broken home has no significance as a predisposing factor in such a syndrome.

In nearly every case the social service follow-up findings substantially confirmed the judgment of the psychiatrist who had examined the subject before discharge. In one case it appeared that an individual presenting the symptom of enuresis might have been retained in the army, for he later made a successful adjustment in the R.C.A.F. There were many cases who could have carried on in the army, especially among those given an administrative discharge, but there had been no suitable employ-

\* The acute psychiatric syndromes occurring in soldiers under combat conditions have been variously called "exhaustion", "combat fatigue", "battle neurosis", etc.



ment available. It may be judged in the light of later findings whether or not it would have been wise to retain these individuals for a longer period of time.

The general findings indicate that these were largely psychoneuroses of civilian origin in individuals who might have been excluded from the army. Hence these cases provide information on the effects on psychoneurotics of army service and give some index of civilian needs for medical treatment in such a group.

The following is one case which illustrates the degree to which medical, social, legal and military factors were intertwined in these cases according to the histories obtained:

Pte. J.H.P., aged 29, enlisted September 16, 1939, and was discharged October 28, 1943, with 2 years and 10 months' overseas service, never having been in battle. His mother had several "nervous breakdowns" and his siblings showed instability, some of neurotic type and one with prison record. This soldier was "nervous" as a child, stuttered, and bit his finger nails. He was somewhat shy and retiring. He was brought up on a farm and reached "entrance" of high school at the age of 17. He married at age 19 in 1934. There are two children born in 1934 and 1939. There was marital trouble in 1936 over financial arguments, with separation for one year. The wife earned by domestic service more than her husband had earned previous to his enlistment. He worked off and on at farm labour while "on relief" from October, 1934 to February, 1939. He refused employment at one time in 1938. He became a garage mechanic in February, 1939.

There was no history of health complaints prior to enlistment. The wife was admitted to a tuberculosis sanatorium in December, 1939, where she remained until January, 1942. After he went overseas in July, 1940, the soldier began losing weight and could not concentrate on his work because of worry over distressing letters from his wife. He suffered from dizziness, headaches, sweating and a tendency to stutter. His army crime record was clear and his conduct "exemplary". He was qualified as a motor mechanic. He contracted V.D.G. in May, 1942. He received an injury from lifting in July, 1942, and complained of back-pain thereafter. He was returned to Canada in May, 1943, on compassionate grounds because of his wife's illness. After return to Canada he complained frequently of his back. Sacro-iliac strain was suggested by a surgical specialist. In October, 1943, he was boarded S4 for psychoneurosis with articular facet syndrome as a secondary diagnosis, and he was discharged on administrative grounds. He believes he was discharged for his back injury. He has not obtained any medical care. He applied to D.V.A. for a pension which was not granted. For 2 weeks after discharge he worked for C.I.L. but found this work too hard for him and he was transferred to bus driving with another company. He has the opportunity of working 7 days a week and making more money but he usually only works 5 days a week and earns about \$80 every two weeks, which is better than he ever earned before enlistment. He has been restless, suspicious, and seclusive since discharge. He boasted to his wife of his "affairs" in England and he accused her of infidelity. He does not drink excessively but his wife believes he wastes his money on gambling. After staying for a few months in the home, he left, and the couple signed a separation agreement in July, 1944. The wife has custody of the

children but she feels badly over the break in the home and believes that she still loves her husband. At the last information he was keeping company with a single girl and he was objecting to his agreement to pay his wife and children \$40 every two weeks. His wife does not want to have to charge him in court with "non-support", however, or make a fuss over the matter.

#### POST-DISCHARGE AND HEALTH ADJUSTMENT

Chart I indicates the post-discharge and pre-enlistment comparisons as to how these individuals felt in regard to their health.\* Most of them were found to be feeling either in worse health (45%) or about the same health (52%) as before enlistment. It must be added that most of those feeling in the same state of health felt that way only after a variable period of "rest" up to several months after discharge. Individuals from rural areas in all districts rested for about three weeks on the average before returning to employment. Those from urban areas seemed to prefer longer periods, averaging 3½ weeks around London, 5 weeks around Toronto, and 10 weeks around Montreal. Thus, a large proportion of all cases either felt they were in poorer health than before enlistment, or felt that they needed varying periods of rest before they were able to resume work.

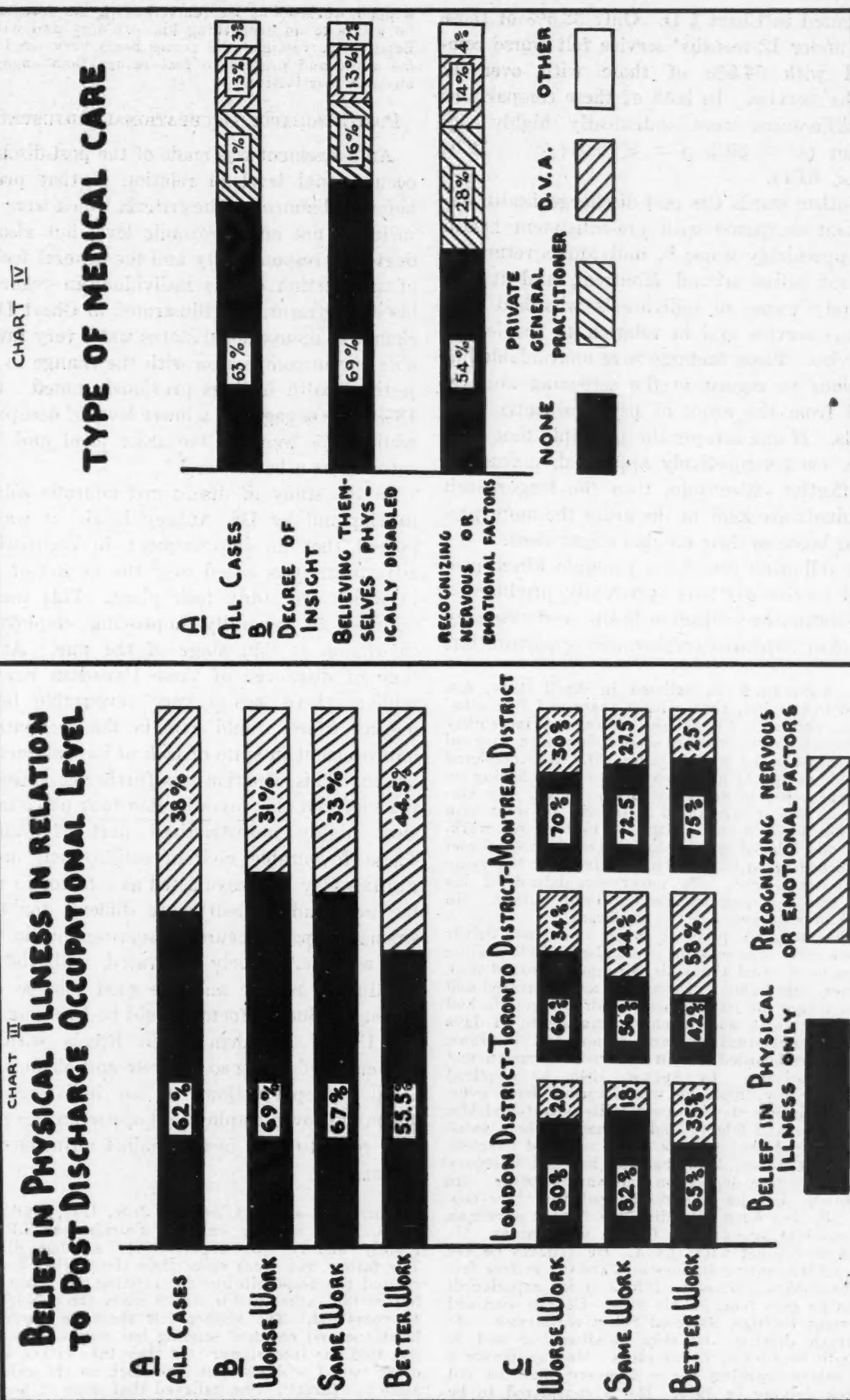
The break-downs in Chart 1(B-D) illustrate certain relationships. The post-discharge health was reported to be worse in a larger percentage of cases in the rural area around Montreal (68%) than in the urban area in this district (42%). This difference was statistically highly significant ( $\chi^2 = 7.8$ ,  $p = < 0.01$ ). A similar trend was indicated around London (87.5% compared with 44.5%) but there were too few rural cases (8 cases) for this to have significance. In the Toronto region both the urban and rural areas yielded percentages essentially equivalent to those in the urban areas around both Montreal and London.

The relationship of "feeling worse" to "service overseas" and to "length of service" was striking. Eighty per cent of those who served overseas felt worse, compared with 41% of those who had seen service only in Canada. The percentages of those feeling worse increased progressively in relation to 6 months, 12 months, 24 months and over 24 months of service, as

\* The charts which follow are not always based on the full 560 cases due to the impossibility of obtaining complete details in every case. However they are never far short of this number and where conclusions have been drawn these were substantiated statistically on the cases for which the relevant details were known.







illustrated in Chart 1 D. Only 38.5% of those with under 12 months' service felt worse compared with 54.5% of those with over 12 months' service. In both of these comparisons the differences were statistically highly significant ( $\chi^2 = 30.3$ ,  $p = < 0.01$ ;  $\chi^2 = 13.9$ ;  $p = < 0.01$ ).

In other words the post-discharge health adjustment compared with pre-enlistment health was appreciably worse in individuals returning to rural areas around Montreal, and it was definitely worse in individuals who had seen overseas service and in relation to the length of service. These findings have unavoidable implications in regard to the screening and removal from the army of psychoneurotic individuals. If one accepts the principle that poor health, even subjectively appraised, makes for less effective citizenship, then the longer such individuals are kept in the army the more precarious becomes their civilian adjustment.

The following case is an example where prolonged service overseas apparently produced a deterioration in subjective health and efficiency in spite of improved employment opportunities:

Pte. A.B., aged 34, enlisted in April, 1940, discharged in October, 1943, with 2 years and 7 months' service overseas. No family history of instability was present but his mother died following a surgical operation when he was 8 years old. He completed Grade IV at age 11 and then had to begin fishing on the Gaspé coast in order to earn a living. He also worked at lumber camps and on farms. He went with his father to Montreal at age 16 to look for work. He did odd labouring jobs during the depression and then worked steadily as a truck driver for ten years prior to enlistment. He never complained of his health, was a strong man and a hard worker. He married in 1938 and has two children.

In the army he qualified as an ambulance driver and was sent overseas in December, 1940. While overseas he worried about his wife going around with other men. He became discouraged and depressed and tried to forget his unhappiness by drinking. He had minor crimes with punishment amounting to 14 days C.B. He complained of poor vision and in June, 1942, he was boarded C1 for a corneal abrasion and taken off driving. In August, 1942, he acquired V.D.G. In July, 1943, he was returned from overseas as a prisoner of war escort. His wife found him very nervous and fidgety and he made quite a scene when he found that he was to be returned overseas again. In October, 1943, he was boarded Category "E" for reactive depression and anxiety state. He understands that he was discharged for "nervousness". He has been attending his family physician who gives him hypodermics for his nervousness. He has had no contact with D.V.A. He believes he has liver trouble, causing indigestion, and he suffers frequent headaches. When he thinks of his experiences overseas he gets tears in his eyes. He has obtained employment through National Selective Service. He tried truck driving and ship building but had to leave both because of nervousness. He now makes a better salary working for a brewery than he did for truck driving in 1939. He is considered to be

a good worker but he quarrels with his foreman, as he wants to do everything his own way and will not listen to correction. He comes home very tired from his work and prefers to rest rather than engage in any other activities.

#### POST-DISCHARGE OCCUPATIONAL ADJUSTMENT

An assessment was made of the post-discharge occupational level in relation to that present before enlistment. The criteria which were used included not only economic level but also the degree of responsibility and the general feelings of satisfaction of the individual in regard to his employment. As illustrated in Chart II the change in occupational status was a very favourable one in comparison with the change in subjective health feelings previously noted. Only 18% were engaged at a lower level of occupation while 39% were at the same level and 43% actually at a better level.

In the study of discharged neurotic soldiers in England by Dr. Aubrey Lewis<sup>3</sup> it was reported that an improvement in occupational adjustment was noted over the period of time in which the study took place. This was attributed to generally improving employment conditions at that stage of the war. At the time of discharge of these Canadian neurotic soldiers there was a very favourable labour market which would explain the occupational improvement in spite of lack of improvement in health. This situation was further enhanced by the fact that this investigation took place in the most highly industrialized part of Canada. These favourable civilian employment opportunities may also have acted as a factor in making army adjustment more difficult for those among the psychoneurotics serving only in Canada who were poorly motivated, with the war seeming so remote and the good jobs so close at hand. Such a factor would be less potent in the United Kingdom or in Russia with the reasons for fighting so concrete and obvious.

An example follows of an individual for whom improved employment opportunities probably constituted a factor against adjustment in the army:

Gnr. T.N., aged 28, enlisted July, 1942, discharged April, 1943, serving only in Canada as N.R.M.A. Family history was negative for nervous disease. The father was much older than the mother and she carried the responsibility for running the farm even before the father had a stroke when the subject was 15 years old. The mother felt that her life was a hard one and resented sending her sons to the army. She told the interviewer "If they take either of the other two, I will just put a padlock on the gate and close the farm". She believed that none of her sons



were in sufficiently good health for the army but there was no definite statement of particular health complaints for the soldier before enlistment. He reached Grade IV at age 15 and married at age 25. When called-up off the farm he was "accepted for recheck" by the examining psychiatrist because of borderline intelligence. He was at District Depot for some time and while there he learned something of employment opportunities in the city. He was given eight weeks' training and sent to the east coast. He was lonesome and unhappy and was admitted to hospital in January, 1943, with numerous complaints. He was reported to be poorly adapted and of no value as a soldier. He was given a medical discharge as chronic psychoneurosis. On discharge he obtained a job as a maintenance man at an air craft production field. He is earning more money than ever before and he and his family are considerably better off, for the present, than before his call-up. He professed ignorance of the reason for his discharge: "The army never tells us anything".

The breakdowns in Chart II illustrate certain points. The trends towards the same or better occupations were fairly consistent except that in rural cases around Montreal there was a tendency for more cases to be at a lower occupational level while in rural Toronto and London districts there were fewer such cases. Improved occupational levels were most noticeable in rural cases around Toronto and in all cases in the London district, many of whom were engaged in war industries around Windsor.

The relationship of occupational adjustment to service overseas and to length of service was not as clearcut as was that of health adjustment. As illustrated in Chart II C a higher proportion of overseas cases (27%) was at a lower occupational level than that of Canadian cases (17%). But there was also a higher proportion of cases at a higher occupational level (50% compared with 41%) with a much smaller proportion of overseas cases remaining at the same level as before enlistment. The highest proportion of cases at a lower occupational level was among individuals from the Montreal district who had been overseas (61%—Chart II D) but there were only 13 cases in this group, an insufficient number for statistical significance.

Similarly, although the percentage of cases at a lower occupational level appeared to increase with length of service (Chart II E), so did the percentage of cases at a higher occupational level. In the district breakdowns for this relationship (Chart II F) the Toronto and Montreal cases illustrated these typical trends while the London cases showed no individuals actually at a lower level who had had over twelve months' service. Indeed, in the London group with over twelve months' service, although the number was

not large enough for statistical significance, 70% were employed at better jobs and the other 30% were occupied at least at the same level as before enlistment.

The post-discharge occupational picture, then, has been quite favourable, especially where industrial opportunities have been good. Some increase in unfavourable adjustments has been noted in rural Montreal cases, in Montreal district cases who have been overseas, and to some extent among both Toronto and Montreal cases with more prolonged service. This latter trend had been balanced by a simultaneous trend towards more favourable adjustment with prolonged service. The most noticeable difference in relation to length of service was that of a decrease in percentage of individuals at the same occupational level as before enlistment.

#### ATTITUDE TO SYMPTOMS

We were interested to determine how many of these discharged psychoneurotics had any awareness of the relevance of nervous or emotional factors to the symptoms which they presented. Although only about 25% of all cases had any justification, so far as supplemental medical diagnoses were concerned, for a belief that at least part of their symptoms might be due to physical disease, there were 62% of all cases (Chart III A) who expressed the belief that their disability was entirely physical and who admitted no awareness of nervous or emotional factors. The other 38% believed in varying degrees of physical incapacity but admitted that "nervousness", worries, conflicts, etc., had something to do with their inability to carry on in the army. Some of them even had quite good insight into the essential factors of their maladjustment.

As illustrated in Chart III B there appeared to be a relationship between the presence of insight and the readjustment at a better occupational level. This was a significant relationship as far as the total series was concerned ( $\chi^2 = 6.98$ ,  $n = 2$ ,  $p = 0.05$  to  $0.02$ ). This relationship was not borne out, however, in the Montreal area where over 70% of cases lacked insight regardless of the occupational level. It was confirmed in both the London and Toronto areas, being statistically significant in the latter area where there were considerably more cases than in the London area ( $\chi^2 = 5.5$ ,  $n = 1$ ,  $p = 0.02$  to  $0.01$ ). The high percentage of cases believing in physical disability in the London

area (71%) must be considered in the light of the fact that, whereas less than 25% of the cases in the Toronto and Montreal areas had some justification for this belief in the form of some other relevant medical or surgical diagnosis, there were 61% of cases in the London area with some such justification. This was related to a difference in policy in this particular district in regard to the enlistment of low category\* personnel.

The relationship of insight to better work level, exemplified particularly in the Toronto area, might be interpreted in several ways. In many cases it seemed that the belief in physical disability was a factor preventing the individual from improving his occupational status in spite of improved opportunity. Conversely a poorer occupational adjustment might have been acting in the direction of increasing the belief in physical illness as a rationalization for failure. The association on the other hand, may have been a result of a number of more intelligent individuals whose intelligence facilitated insight as well as resulting in better jobs. There were, however, many individuals not lacking in intelligence who exemplified a relationship between a belief in physical disability and employment disadvantage.

The following is an example of an individual of at least average intelligence whose occupation was limited by symptoms which the subject believed to be of physical origin:

Pte. G.J.M., aged 27, enlisted in March, 1943, and was discharged in September, 1943, with active service only in Canada. Both parents were temperamental, high-strung people. The mother had died of pernicious anemia when the subject was 8 years old and his father died a little later of kidney trouble. The subject was an only child and had to begin part time work at age 10. He reached Grade IX at age 16. He worked as a store clerk and then as a bread and milk salesman at which he did very well, often being considered a "born salesman". Before enlistment he suffered from kidney trouble which sometimes interfered with his work. In the army "his feet broke down" and he developed many aches and pains which he considered due to rheumatism. He was worried about the financial situation of his wife and child but he did not think this had anything to do with his health. He developed a peculiar gait and was referred to a D.V.A. hospital where he was medically discharged for psychoneurosis (hysteria). He believes that his discharge was because of inability to meet physical requirements. Since discharge he has been working as a bookkeeper at the same salary as before enlistment but he believes that he could do better as a salesman or in some other more active employment if it were not for his "rheumatism". He has become quite seclusive since his discharge and meets far fewer people than he did before. His wife re-

ported to the interviewer that she was discouraged about his earning capacity and wondered what was actually wrong with him since he was continually complaining of aches and pains. She would also like to live a more active life socially but has given up discussing this with her husband since it annoys him so.

#### INFORMATION SHOULD BE GIVEN

There is enough suggestion of the possibilities of a vicious circle between poor occupational adjustment and belief in physical disability, to indicate the desirability of attempting to give these individuals more insight into the most important factors in the production of their symptoms.

It appears that medical officers, including psychiatrists, had not given many of these individuals any lasting appreciation of the nature and causes of their condition. In the interests of civilian readjustment some explanatory psychotherapy should be given to these psychoneurotic soldiers, probably at the time of discharge. Whether this is primarily a responsibility of the Department of Veteran's Affairs or of the Army Medical Corps is less important than that a co-operative plan should be worked out whereby this job is done by whatever agency or specialist is best able to do it. It comes in the sphere of special treatment for service personnel.

For the information of medical officers and civilian physicians dealing with these psychoneurotic soldiers either before or after discharge, the types of physical disabilities which they most commonly believe themselves to have should be of value. These are summarized in Table I.

TABLE I.  
DISABILITIES WHICH DISCHARGED PSYCHONEUROTICS  
BELIEVE THEY HAVE

Stomach trouble .....	19.0%
Foot and leg trouble.....	14.5%
Bronchitis and respiratory.....	11.0%
Heart trouble .....	8.0%
Underdevelopment and physical inadequacy...	7.0%
Arthritis and rheumatism.....	6.0%
Neurological symptoms .....	5.5%
Lumbago, sciatica and back pain.....	5.0%
Kidney trouble and enuresis.....	4.0%
Eyes .....	4.0%
Injuries .....	3.5%
Blood pressure disorders.....	2.0%
Rupture (hernia) .....	2.0%
Age .....	1.5%
Ear trouble .....	1.0%
Miscellaneous .....	6.0%
	100.0%

The separate districts varied somewhat in the actual percentages of each type of disability but in general they followed the order in this table. The belief in general underdevelopment and

\* Recruits with B or C medical category or with pulhems rating of grade 3 or 4.



physical inadequacy was more common around Montreal than in the other two areas, while the belief that the symptoms were the physical result of injuries ranked higher in the London list than in the other two regions.

#### TYPE OF MEDICAL CARE

Of particular interest is the question of what type of medical care was being received by these individuals. Chart IV A indicates the various types of medical care being obtained: 63% of all cases were getting no medical care whatsoever; 21% were attending a private general practitioner; 13% had sought D.V.A. facilities. This, however, included individuals attending for minor matters such as dental care or glasses and those seeking pensions. Six cases were receiving pensions through D.V.A. for some disability other than psychoneurosis. Nine had applied for pensions of which seven had been refused; the other two were still pending. Some had been told that they were not ill, and that there was nothing wrong with them. They were inclined to feel that this was not true for they still had their symptoms. Many of those not seeking D.V.A. facilities were ignorant of their privileges in regard to medical care as well as of other aspects of rehabilitation opportunities.

Three per cent of all cases had some kind of medical care other than D.V.A. or private general practitioner. These included private specialists such as nose and throat specialists for "sinus trouble". None were attending a private psychiatric specialist. Four cases were found to have been admitted to mental hospitals and six were in jail. One already mentioned had enlisted in the R.C.A.F., who might have been treated and retained in the army. Two were attending chiropractors and one an osteopath, while another one was intending to go to a chiropractor since he had been unable to obtain help from the regular doctors.

The failure to get any medical care was directly related to subjective health adjustment. Most of those (88%) who were feeling better than before enlistment were not interested in receiving any medical care at all. However, this was a very small group and even among those feeling worse than before enlistment 53% were getting no medical care.

There was no evident relationship between medical care and post-discharge occupational adjustment but, as illustrated in Chart IV B, there was a highly significant relationship be-

tween obtaining medical care and having insight into the relevance of nervous or emotional factors ( $\chi^2 = 12.6$ ;  $p = < 0.01$ ). In other words, those individuals with no psychiatric insight, who believed themselves to be physically disabled, and who, as already has been shown, tended to make a poorer occupational adjustment than they had prior to enlistment (Chart III B), were tending not to get medical care.

Were these cases, then, instances of simple deceit, individuals claiming to be ill in order to evade military service but not really ill enough to need a doctor? If so, why the relationship to employment at a lower occupational level in spite of existing favourable employment opportunities? The employment situation must forestall any such simple superficial explanation. We are reminded that these were cases diagnosed as psychoneurosis on positive grounds, not merely by excluding organic physical illness, in which long standing symptoms or early instability had been confirmed by social service investigation as being present in about the same percentage of cases as are usually reported for service psychoneuroses.

Why was it that these individuals did not seek medical care in a majority of instances even though they believed that they were suffering from some physical disability? Some of them seemed to be using their complaints for avoiding heavy work, and the occasional absence from work. As one man explained: "I must take one day off from work each week to rest my back". These individuals might be reluctant to lose their symptoms. Just lazy? Only if laziness is considered a symptom which might be relieved under proper handling.

Many of them gave no evidence of wishing to remain sick but indicated disillusionment about help from medical sources. Many of them quoted doctors, either in the army or out of it, as having told them they could not help them. Some of them described with bitterness how they had been told again and again by army doctors that there was "nothing wrong" with them and yet they believed that they had finally been discharged for a physical disability which the doctor had been unable to find. One of them described his brother as also having a "bad heart", but "medical examination wouldn't find anything wrong with it".

\* A few individuals were spending considerable sums of money in going from doctor to doctor

or in trying various proprietary preparations but the majority of those believing themselves unwell had despaired of help. Apparently we cannot judge the extent of psychoneurosis in the general population by the numbers of such individuals who continue to visit physicians' offices or hospital clinics. If a patient does not return that does not mean that he is cured.

So many of these individuals are still feeling in poor health and are believing themselves ill, with a proportion of them failing to share in improved employment opportunities because of their symptoms, that we can look on them as constituting a nucleus likely to increase in size if and when less favourable employment opportunities should prevail. More and more of the other psychoneurotic individuals now more favourably situated will tend to enter their ranks and become caught in the vicious circle between unsatisfactory occupation or unemployment and physical complaints which justify to themselves their lack of success. Apparently present medical facilities are not helping greatly to alter or prevent this vicious circle.

In view of the fact that most of those receiving medical treatment were under the care of general practitioners, and because the attitude of hopelessness towards their condition was often engendered at least partly by general practitioners, either within or without the army, it appears particularly important to stress the need for more adequate education to general practitioners in the handling of the psychoneuroses. Such education, along with more adequate mental hygiene and psychiatric treatment facilities, should be considered matters of the greatest importance in the development and planning of Canada's public health program. These individuals have provided a remarkable demonstration that psychoneurosis is one of the most prevalent or crippling conditions interfering with social usefulness, at least among individuals being discharged from the army at the time of this study.

#### SUMMARY

Psychoneuroses constitute the largest single group invalidated out of the Canadian Army. A study has been made by social service investigation of 560 cases of psychoneurosis at a period longer than 3 months after discharge. These represented a 21½% sample of all psychoneurotics discharged from the army with certain biases in the sample because of the time of the

study, the regions to which it was limited and a preponderance of urban cases. The evidence indicated that almost three-quarters of the sample were long standing cases who might have been excluded from the army and that although many cases could have carried on in the army such a policy would have handicapped their post-discharge adjustment.

There was a positive relationship of subjective feelings of ill health to long service in Canada or service overseas. At the time of follow-up, most of the group studied were feeling either in worse health than before enlistment or in about the same health as prior to enlistment after a variable period of rest. The period of rest was longer and the present health situation was worse among cases in the Montreal district.

The occupational adjustment after discharge, on the other hand, tended to be either improved or at about the same level as prior to enlistment. This seemed to reflect prevailing favourable employment opportunities. Fewer cases with more prolonged service were at the same level as prior to enlistment, tending to become either worse or better in occupational adjustment the longer they had been in the army. Rural cases in the Montreal district were faring less well than cases elsewhere.

Over half of all the groups studied believed themselves to be suffering entirely from some physical disability and showed no insight into the relevance of nervous and emotional factors. Such a belief, which was expressed as "stomach trouble", "foot trouble", "bronchitis", "heart trouble", "underdevelopment", "rheumatism", and a variety of other disorders, was more common among individuals now engaged at a lower occupational level than before enlistment. Individuals holding such beliefs were also getting no medical care in a larger proportion of cases than those who displayed some insight. Over half of all cases, even among those feeling worse than before enlistment, were getting no medical care. Frequently they expressed themselves as disillusioned about the value to them of medical care.

These findings indicated the need for trying to give these individuals more insight into their condition, probably at the time of discharge. They also indicated the importance from a public health point of view of providing adequate medical care for this group. In view of the fact that of those getting medical care the



majority get this from general practitioners, it is suggested that improved education of general practitioners in the handling of the psychoneuroses is one of the most urgent among the mental hygiene provisions required.

This work was carried out under a grant from the Associate Committee on Army Medical Research of the National Research Council of Canada. The social service investigations were made by the following: Lieutenants M. F. Henderson, G. M. Patry and I. Page, Mrs. H. Horton and Miss M. St. Martin.

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### PENICILLIN THERAPY IN SKIN INFECTIONS\*

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THE following report of the results of penicillin therapy covers the period from March 1, 1944 to May 31, 1944, and represents 20 cases treated by Lieut.-Col. John Kilgour at No. 12 Canadian General Hospital, and 73 cases treated at Leavesden Military Hospital (Nos. 10 and 20 Canadian General Hospitals). The penicillin was supplied by the Allied Services Overseas Committee on Penicillin. The project has been considered one of research throughout so that every effort has been made to investigate the cases thoroughly, both clinically and bacteriologically, and to follow the patients after treatment as well as is feasible under active warfare conditions.

There is no necessity in a report of this type to review the literature exhaustively. Penicillin has been used by both American and British investigators in the form of a powder diluted with sulfanilamide, as a solution in water or saline, and in an ointment base. The latter was considered the most economical and, as economy of the drug is so important, was adopted. Four problems immediately presented themselves: (1) a suitable base; (2) the amount of penicillin per gram of this base; (3) the frequency of application; (4) the type of case to be treated.

#### SUITABLE BASE

British investigators, Bodenham<sup>1</sup> and later Roxburgh *et al.*<sup>2</sup> had used lanette wax SX, soft

paraffin and water in equal parts as a base and found it fairly satisfactory. It was decided to use lanette wax SX 25% in water without the soft paraffin, which proved to be a very satisfactory base. It has the consistency of thin cold cream, spreads easily and mixes freely with serum or discharges. It is not irritating and can be used in wounds or in the conjunctiva without discomfort. No cases of dermatitis have resulted from the base, which is a decided advantage. However, it tends to flake off the skin when dry, which is a disadvantage. This has been corrected by the addition of 10% paraffin oil; the present formula now being: lanette wax SX, 25%; paraffin oil, 10%; water, q.s. ad 100%.

*Amount of penicillin per gram of base.*—It was arbitrarily decided at first to use 500 units of penicillin per gram of base. Later this was reduced to 250 and there was no diminution in the effect. As little as 100 units per gram is effective in burns (Bodenham<sup>1</sup>) but the higher figure is likely the safer one, particularly if the emulsion is kept for several days.

*Frequency of application.*—Roxburgh *et al.*<sup>2</sup> used the emulsion once a day. As there is fairly rapid destruction of penicillin at room temperature or when exposed to air, it is probable that there is no active penicillin present for more than part of the day. Quite arbitrarily, it was decided to apply the penicillin emulsion every four hours six times in 24 (q. 4 h. x 6) for three or four days or until definite clinical improvement was noted, and then reduce the frequency to q. 8 h. x 3 for the remainder of the treatment. After a short time on this regimen the frequency was reduced to q. 6 h. x 4 for the first three or four days and then q. 8 h. x 3 for the balance of the treatment.

#### TYPE OF CASE TO BE TREATED

It was originally decided to treat only impetigo contagiosa of the classical type but this was quickly extended to include folliculitis of the beard (sycosis barbæ). A short time later acute and chronic pyogenic infections of the upper and lower extremities were included (ecthymatous ulcers, ulcerative impetigo or "desert sores") and acute pyoderma (impetigo) of the hands and feet.

Before treatment was instituted, careful notes were made of the type of eruption, areas affected, duration of the disease, previous treatment and previous improvement in the condition, either

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spontaneously or as a result of treatment. Cultures were taken following the removal of crusts with normal saline or opening of pustules. The hospital laboratories co-operated in every way in the bacteriological studies of these cases.

These studies were completed before treatment was instituted. The organisms were identified—streptococcus, staphylococcus, etc.—and if staphylococci were found the coagulase test was performed to evaluate pathogenicity. Then all organisms present were tested for penicillin sensitivity by the ditch-plate method described by Fleming.<sup>3</sup> It is a waste of a valuable agent to use penicillin to treat infections caused by a penicillin-resistant organism, therefore, this preliminary investigation must be done in every case. Nothing will discredit penicillin more than its indiscriminate use.

The routine adopted was to use saline compresses only while the bacteriological studies were being completed. Then, if the case was suitable, the crusts were bathed off, the pustules opened aseptically and penicillin emulsion was applied thinly with a sterile wooden tongue depressor. The emulsion must be kept at ice box temperature at all times when not in use and care must be taken to avoid metal containers and contamination, hence the sterile wooden tongue depressor. Face, neck and ears were left uncovered but arms and legs were usually lightly covered with clean gauze after the emulsion was applied. The frequency of application has already been discussed.

The present report covers 93 patients who have completed treatment. Insufficient time has elapsed for an adequate follow-up of patients to evaluate relapse rate. Under present conditions it is not justifiable to insist on the return of well patients to hospital in order to check results. For these reasons it is probable that the results discussed below are better than they would be with longer study and more complete follow-up of patients.

#### CLASSIFICATION OF CASES

1. Impetigo of face, ears and scalp ..... 37 cases
  - (a) Uncomplicated ..... 17 cases
  - (b) Complicated by seborrhœic dermatitis, otitis externa, eczema or sulfonamide dermatitis.... 20 cases
2. Folliculitis of the beard (sycosis barbæ).... 24 cases
3. Ulcerative impetigo of upper and lower extremities (ecthymatous ulcers, "desert sores") ..... 32 cases
  - (a) Uncomplicated ..... 15 cases
  - (b) Complicated by varicose dermatitis, eczema or sulfonamide dermatitis ..... 17 cases

TABLE I.  
BACTERIOLOGICAL INVESTIGATION OF CASES

Class	Bacteria found on culture			
	<i>Staph. pyogenes</i> (coagulase +)	<i>Strep. hæm.</i>	<i>Staph. and Strep.</i>	<i>Staph. and diphtheroids</i>
1. Impetigo face, etc.				
(a) Uncomplicated	10	0	6	1
(b) Complicated..	8	0	10	2
2. Folliculitis of beard.....	19	0	5	0
3. Impetigo, legs and arms:				
(a) Uncomplicated	6	0	7	2
(b) Complicated..	4	1	11	1

The interesting points that emerge from the bacteriological studies are:

1. The preponderance of *Staph. pyogenes* (coagulase +). In only one culture in 93 cases were staphylococci not found.

2. Cases were cultured on arrival in hospital in most instances so that chance of contamination from other patients in the ward was slight.

3. The organisms were penicillin-sensitive by the ditch-plate method in every case but two, both of which had a sensitive *Strep. hæmolyticus* and an insensitive *Staph. pyogenes*.

4. In the series of 93 cases, three had *Staph. pyogenes* which were penicillin-sensitive at first, and later became resistant, and there were an additional six cases where the organisms were resistant from the first and no penicillin was used. Without bacteriological studies, these nine cases would have been classed as failures of penicillin therapy whereas in reality only three of them were.

#### DURATION OF TREATMENT AND RESULTS

1. *Impetigo of face, ears and scalp*.—(a) Uncomplicated: average duration of treatment 9½ days.

Results of treatment of 17 cases: (1) good, rapid response and no recurrence up to time of report, 13 cases; (2) fair, relapse but response to second treatment, 4 cases; (3) poor, none.

The results in uncomplicated impetigo of the face and scalp were extremely good. Within 24, or at most 48 hours all weeping and crusting had ceased and the patient was comfortable. Underlying inflammation of the skin took several days to clear but, apart from redness, the patients' skin appeared normal by the third or fourth day. If treatment was then discontinued relapse occurred. To prevent this, treatment was



continued for an average of 9½ days. The four relapses were easily controlled by a second course of treatment and, up to the time of this report, had not recurred. In no case of impetigo of the face treated by penicillin did folliculitis of the beard occur. This is the complication of impetigo of the face in the adult male most to be feared, therefore, the prevention of this is a decided advance in therapy.

(b) Complicated by seborrhœic dermatitis, otitis externa, eczema or sulfonamide dermatitis, average duration of treatment 12 days.

Results of treatment of 20 cases: (1) good, 13 cases; (2) fair, 6 cases; (3) poor, failure, 1 case.

When the impetigo was secondary to seborrhœic dermatitis or was complicated by a co-existing sulfonamide dermatitis, the results were not nearly as striking as in the uncomplicated series. The infection was quickly controlled but the underlying dermatitis persisted so that recurrence was common. Frequently the co-existing dermatitis had to be treated by x-ray before the skin returned to normal. External otitis proved very resistant to treatment and recurrence of the impetigo at this site was common. The one complete failure in this series was a case of widespread impetigo of the face, ears, neck, forearms and legs on a seborrhœic basis and caused by *Staph. pyogenes* and *Strep. hæmolyticus* which responded for 72 hours and then the whole treated area became acutely inflamed. Penicillin was stopped on the sixth day and the acute inflammation gradually subsided. Two weeks later a patch test with penicillin emulsion, 250 units per gram, was done on the right side of the forehead controlled by the emulsion only on the left side and this test was positive. This was the second case of contact dermatitis due to penicillin or its impurities encountered in this series.

2. *Folliculitis of beard (sycosis barbæ)*.—Average duration of treatment, 12 days.

Results of treatment in 24 cases: (1) good, response to treatment with clearing of eruption and no relapse to date, 13 cases; (2) fair, relapse but control of disease by second or third course of penicillin, 4 cases; (3) poor, failure to respond, 7 cases.

The immediate response to treatment in this disease was very dramatic. Some patients who had suffered from papules and pustules in their beard for months or years, notwithstanding numberless treatments, were completely clear in

four or five days and remained so as long as treatment was continued.

However, in this series relapses were very common. Two of the failures were cases who responded well initially, relapsed and did not respond the second time. Original cultures of each revealed *Staph. pyogenes* penicillin-sensitive but repeat cultures after relapse showed *Staph. pyogenes* penicillin-resistant. It was felt that in each case the organism had developed penicillin resistance within a few days of cessation of treatment. Each patient had epilation of the beard by fractional doses of x-ray and was apparently cured on discharge.

To attempt to prevent relapse, the patients were instructed to scrub their faces with soap and water before each treatment in order to cleanse the opening of the hair follicles as well as possible. This did no good, so a routine of half strength ung. quinolor (Squibb) applied twice daily was instituted. This was started on the day penicillin was discontinued and has seemed to be of definite value in preventing relapse.

Penicillin therapy is by no means a cure-all for folliculitis of the beard but is the best single topical remedy for this condition and in many cases the results were extremely good. No soldier should be boarded out of the army because of folliculitis of the beard (*sycosis barbæ*) unless he has had a thorough trial with penicillin locally applied.

One case of sensitivity to penicillin or its impurities was encountered in this series. He had an eight months' history of beard infections and a pure culture of penicillin-sensitive *Staph. pyogenes* (coagulase +) was found. He improved rapidly on therapy and by the sixth day his face appeared almost normal.

Penicillin emulsion was continued, and the next day the whole bearded area was slightly red and itchy. The following day the face appeared worse and penicillin was discontinued. Five days later patch tests and controls as described previously were done on the malar regions and forearms. The test was positive to the emulsion and negative to the control on the malar region but negative to both on two occasions on the forearms. This test was repeated with a different make of penicillin six weeks later and was again positive. This was the first case of penicillin sensitivity encountered.

3. *Ulcerative impetigo of upper and lower extremities (ecthymatous ulcers, "desert sores")*.

—Average duration of treatment, 10 days; (a) uncomplicated, 15 cases.

Results of treatment of 15 cases, (1) good, 15 cases. There were no relapses or failures in this group.

The results of treatment in these acute and chronic ulcers of upper and lower extremities were most successful of all. Some of these patients had been hospitalized in the Mediterranean area or in England for months before being tried on penicillin. Within 72 hours the patient was free of discomfort and the ulcers were clean, dry and filling in. By the end of a week, most of them were healed but treatment was continued for three more days to prevent relapse. When this is compared with the weeks of local treatment without improvement or with the frequent development of sulfonamide dermatitis following the prolonged use of sulfonamides, the comparison is most gratifying.

The number of cases of acute pyogenic infections of the feet was proportionately great. While it is true that some of these are primarily fungous disease with secondary pus infection, the vast majority are pyogenic infections from the start and are usually misdiagnosed acute fungous infections. When seen, the condition has usually been aggravated by the application of such things as Whitfield's ointment, iodine, formalin, etc. Some of these cases had huge pockets of pus between and under the toes and on the soles. These were opened widely, penicillin emulsion was applied four times daily and the results were dramatic in 48 to 72 hours. Far too little attention has been paid in the past to the frequency of acute pyogenic infections of the feet simulating fungous infections.

(b) Complicated by varicose dermatitis, eczema, impetiginous dermatitis and sulfonamide dermatitis, average duration of treatment 14 days.

Results of treatment of 17 cases: (1) good, 13 cases; (2) fair, 4 cases; (3) poor, 0 cases.

Some of these cases were complicated by stasis in the legs or ankles, or by the development of eczematous changes following chronic infection or by sulfonamide dermatitis and in these the results of therapy were much less striking than in the uncomplicated ones and the tendency to relapse was greater. In several, injection or ligation of varicose veins was performed after clearing the infection with penicillin and the patient was then returned to duty. In others,

x-ray therapy was used to clear the residual eczema, impetiginous dermatitis or sulfonamide dermatitis.

#### AMOUNT OF PENICILLIN USED PER PATIENT

Only an approximate estimate can be given of the amount of penicillin used per patient as it was not feasible to have a separate jar of the emulsion for each patient when large numbers were being treated. When the strength of the emulsion was reduced to 250 units per gram of base approximately 30,000 units was used for each case of uncomplicated impetigo of face, ears or scalp and 35,000 units for the complicated cases. Due to the prolonged treatment, cases of folliculitis of the beard required about 40,000 units. As the cases of ecthymatous ulcers of the extremities involved a large area, they required about 40,000 units for the uncomplicated and 55,000 units for the complicated cases. At this rate, about 4 million units of penicillin was required for the treatment of 93 patients. When one considers the comfort of the patient, the diminution of stay in hospital and the return of trained personnel to duty, this expenditure of penicillin is more than justified.

#### SUMMARY

1. The results of penicillin therapy in 93 cases of pyogenic skin infection are reported.

2. Complete bacteriological investigation of these cases was carried out by the military hospital laboratory staff.

3. Proper follow-up of these patients has been too short to evaluate relapse rate. Proper follow-up is not feasible in an army group under active warfare conditions.

4. The results in impetigo of the face, scalp and ears were excellent.

5. The results in the treatment of folliculitis of the beard (*sycosis barbæ*) were the best obtained by any topical remedy but the treatment is by no means a cure-all and relapses were frequent.

6. The results in the treatment of acute and chronic ulcerative impetigo of the lower and upper extremities (ecthymatous ulcers, "desert sores") were dramatic and this type of therapy is infinitely superior to any other. The results in the treatment of acute pyoderma (impetigo) of the feet were excellent.

7. Two cases of sensitivity to penicillin or its impurities, confirmed by patch test, are reported.



8. Two cases of the development of penicillin resistance in *Staph. pyogenes* following a break in treatment are reported.

9. The frequency of application, strength of the emulsion, suitable base and type of cases treated are discussed.

#### CONCLUSION

Penicillin used in an emulsion base offers a real advance in treatment of superficial skin infections. However, bacteriological investigation must be done in every case to determine the organism and its penicillin sensitivity, otherwise a valuable remedy is wasted. Nothing will discredit penicillin more than its indiscriminate use by over-enthusiastic investigators.

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### ACUTE FLUORIDE POISONING\*

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RECENTLY, the writer was consulted about treatment of acute fluoride poisoning, in view of the increasing use of fluorine and fluorine-containing compounds in industries. In outlining the treatment recommended, a point which was stressed was that, aside from death due to the corrosive action of the poison, death may result very rapidly from reduction of the calcium content of the blood.

A number of textbooks on toxicology in the English language do not mention fluoride poisoning.<sup>1, 2, 3, 4</sup> A recent and widely-used textbook on therapeutics does not mention it,<sup>5</sup> and, though all of the textbooks which were investigated and in which fluoride poisoning is described mention signs and symptoms which may be caused by reduction of the calcium content of the blood, five only<sup>6 to 10</sup> associate them with a disturbance of calcium, though textbooks on pharmacology have done so for some time. In the 4th edition of Sollmann's Pharmacology<sup>11</sup> it is stated that "the acute effects may be due partly to disionization of calcium, similar to oxalates" and it is suggested that "intravenous injection of calcium chloride might be useful". In Webster's Legal Medicine and Toxicology<sup>6</sup> there is the statement that fluorine "combines with the calcium of the tissues and becomes, therefore, a protoplasmic poison". In Leschke's Clinical Toxicology<sup>7</sup> it is stated that "sodium-fluoride produces disorders of the calcium metabolism similar to those which occur after removal of the para-thyroid glands". In the recent (8th) edition of Sydney Smith's Forensic Medicine<sup>8</sup> it is pointed out that, in addition to their cor-

rosive action, fluorides are "generally protoplasmic poisons closely allied to the oxalates" and, under "oxalates" (p. 448) it is stated that there is every reason to believe that the action of oxalic acid is "partially or wholly due to the combination of the acid with the calcium salts of the blood and tissues, thus rendering the essential calcium ions inoperative". The resemblance to oxalates is also mentioned by Underhill and Koppányi.<sup>9</sup> The fact that acute fluoride poisoning may have a serious effect upon the calcium content of the blood is dealt with at some length in McNally's Toxicology.<sup>10</sup>

Of the above-mentioned five books in which there is reference to possible disturbances of calcium metabolism, two only<sup>8, 10</sup> deal with the necessary treatment. The others, in common with all books in which acute fluoride poisoning is mentioned, recommend use of calcium-containing compounds by mouth before and during gastric lavage; but this, as is either specifically stated<sup>6, 9, 12</sup> or is obvious otherwise,<sup>13, 14, 15</sup> is merely for the purpose of converting the ingested fluoride into insoluble calcium fluoride and thus preventing further absorption of the poison and corrosive action locally. In their Pharmacological Basis of Therapeutics<sup>16</sup> Goodman and Gilman also mention use of calcium salts only for the purpose of precipitating the unabsorbed fluoride. In Sydney Smith's Forensic Medicine<sup>8</sup> the author recommends transfusion of a neutral calcium salt, such as calcium gluconate when "the general effects appear to be due to the withdrawal of calcium from the fluids and tissues of the body".

McNally<sup>10</sup> recommends calcium gluconate "intravenously immediately after washing out the stomach". The extremely urgent need of such treatment, at times, may be seen in the experiences with a fatal case in the Montreal General Hospital. The patient was moribund and died before calcium gluconate could be administered. The case is, however, instructive because of (a) the extremely low blood calcium and (b) the slight degree of corrosion of the stomach, which clearly indicated that death was not due to the corrosive action of the poison but largely to the reduction of the calcium content of the blood. The following are, briefly, the facts of the case.

A man, aged 39, was admitted to the out-door department of the Montreal General Hospital with a history of having attempted suicide by ingestion of sodium fluoride. Though, in "shock", he was able to tell the intern on duty what he had taken and when he had taken it. He also stated that, soon after he had taken the poison, he began to have "muscle spasms" in the feet and hands. *He did not vomit.* When the intern saw him, the striking features were salivation, low blood pressure and "spasm of the hands resembling the carpal spasm of tetany". The stomach was washed thoroughly and about 15 gm. of calcium lactate were left in the stomach. He lost consciousness.

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rapidly and died from respiratory failure three hours and five minutes after ingestion of the poison. A sample of blood, taken a few minutes before he died, showed 2.6 mgm. only of calcium per 100 c.c. of serum, which, as far as I have been able to ascertain, is the lowest value ever found in a human being. (Normal = 9 to 11.5 mgm. per 100 c.c.)

At the autopsy (by the coroner) the only evidence that a corrosive poison had been taken was a small area of swelling of the mucosa of the stomach near the duodenum, which fitted in with the complete absence of vomiting both before and after his admission to the hospital. A case with no gastro-intestinal symptoms has been reported by McNally.<sup>10</sup>

Before describing treatment recommended in such cases, an attempt will be made to summarize briefly the essential facts about fluorine and fluorine-containing compounds and their toxicology, in view of the increasing use of these compounds in industries.

#### OCCURRENCE

Fluorspar ( $\text{CaF}_2$ ), a naturally occurring fluorine compound, has been known since 1529. It was first used for etching of glass in 1670<sup>17</sup> and has been used extensively for this purpose since then. Clouding of electrical bulbs is an example. It is used extensively as a flux in smelting metals, during which volatile silicon tetrafluoride ( $\text{SiF}_4$ ) is a by-product. Enormous quantities of cryolite ( $\text{Na}_3\text{AlF}_6$ ) are used for production of aluminium, and, during this process, highly volatile hydrofluoric acid (HF) is an unavoidable by-product. Phosphate rock, which contains about 3.5% fluorine, is used for manufacture of superphosphate used in animal and plant nutrition. Fluorides are required for manufacture of insecticide sprays and powders and of rat poison. Rubber, textile, ceramic, hide and skin, enamel, cement, glue, brick, wood, refrigeration and magnesium casting are examples of other industries in which fluorides are used.

#### TOXICOLOGY

*Types of poisoning.*—These may be considered under three headings, namely, (a) fluorine gas; (b) hydrofluoric acid, and (c) soluble salts of fluorine. Their importance as poisons is in the reverse order. Acute fluorine gas poisoning is so rare that it needs only mere mention; whereas, most of the deaths, accidental and suicidal, have been due to sodium fluoride and other soluble fluoride salts.

*Fluorine.*—This is one of the most active elements, combining very readily with metals

and, therefore, does not occur in a free state in nature. It reacts very readily with the moisture in the air to form hydrofluoric acid. Industrially, therefore, the hazard, as in production of aluminium from cryolite, is not from the element but from the acid.

Fluorine is a light, greenish-yellow gas and produces intense irritation of the conjunctivæ and mucous membranes of the air passages, causing violent spasms of coughing, with pain in the chest, which may persist for some time after the victim has been removed to fresh air. The most serious effects are upon the lungs. The exact mechanism is not clear. Experiences with chlorine gas in the Great War and since then have shown that the most serious results, such as pulmonary oedema, are not explained entirely by production of a corrosive acid, and there is reason to believe that this also applies to fluorine.

*Treatment.*—Fresh air, warmth, rest, hot sweet drinks and oxygen immediately for any degree of cyanosis. Experiences with lung irritant gases in the last war showed that no person in whom it was possible to restore a pink colour by proper use of oxygen died from simple pulmonary oedema.<sup>18</sup> Even mild cases should be kept under observation for the first 24 hours for the possibility of delayed onset of pulmonary oedema.<sup>19</sup>

*Hydrofluoric acid.*—This is a colourless liquid which fumes in air. It is a violent poison, both in itself and also because the commercial product may contain sulphuric acid. It irritates all tissues with which it comes into contact. The solutions used for etching of glass contain anywhere from 15 to 40% of hydrofluoric acid.

(a) *Inhalation.*—Inhalation of hydrofluoric acid fumes in very high concentrations may produce vomiting and rapid collapse. In lesser concentrations, they produce inflammation and ulceration of the conjunctivæ and of the mucous membranes of the nose, mouth, larynx and bronchi. As little as 10 parts of the acid per 1,000,000 parts of air has produced such ulcerative lesions and broncho-pneumonia.<sup>20</sup> For treatment, see fluorine.

In lower concentrations for short periods, except for temporary cough and lachrymation, which soon passes off in fresh air, the fumes are apparently harmless. The maximum allowable concentration for prolonged exposure is about 2.5 mgm. per cubic metre or, approximately, three parts of the gas per 1,000,000 parts of air.<sup>21, 22</sup> Prolonged and repeated exposure to



mildly irritant concentrations seems to decrease the sensitivity to the fumes. A personal experience may be cited here as an example. While visiting an aluminium production plant, the writer found the fumes very uncomfortable; they produced marked lachrymation, a sensation of suffocation and cough which continued for about one-half hour after having left the contaminated atmosphere; whereas, no discomfort was noticed amongst the many workers, none coughed, and none showed any lachrymation.

(b) *Ingestion*.—Hydrofluoric acid, when taken by mouth, is a violent corrosive poison. The chief features are marked dysphagia, vomiting and collapse, and death may occur within a few minutes. The buccal mucosa may be bleached and there may be denudation of the epithelium of the tongue, pharynx and œsophagus. Even in contact with skin such solutions produce blisters and gangrene. The burns are painful and heal slowly.

The minimum lethal dose by mouth is not known. One tablespoonful of a 9% solution has caused death.<sup>6</sup> When death does not occur within an hour, in addition to the signs and symptoms due to the corrosive action locally, there may be also those produced by reduction of the calcium content of the blood and by direct action of the poison on the heart muscle. For signs of the latter and treatment, see below.

#### FLUORIDE SALTS

Most deaths, accidental and suicidal, have been due to these compounds. Sodium fluoride heads the list, and the description of it here applies, in general, to the other soluble salts.

Fluorine is widely distributed in nature. It is, therefore, a constituent of normal body tissues, particularly teeth and bone; but, like lead, it is present in minute traces and probably as a contamination rather than for physiological needs. Sodium fluoride is a corrosive and a general protoplasmic poison. It is poisonous to plants and bacteria and inhibits enzyme action (urease, lipase, etc.). It combines with calcium in an ionic state to form insoluble calcium fluoride. Calcium, as is well known, is indispensable for the functional integrity of the voluntary and autonomic nervous systems; but only calcium in ionic form is physiologically active, and it is precisely such calcium which is attacked by fluorides. Sodium fluoride thus lowers the available calcium of the blood and thus produces low-calcium tetany. For the same reason, sodium fluoride is an anticoagulant,

but also probably by an effect upon thrombin formation and also injury to the liver. Normal coagulation, for example, is not restored by replacing the calcium lost by precipitation but only if thrombin is also added.<sup>11</sup>

Sodium fluoride is not very soluble (a saturated solution contains, approximately, 4 grams per 100 c.c.) but, when in solution, it is rapidly absorbed from the stomach. Destruction of the mucous membrane lining of the stomach increases the absorption. Unlike the other halogens (chlorine, bromine and iodine), however, it is slowly excreted and thus tends to accumulate in the body tissues as insoluble calcium fluoride, which tends to deposit in the liver, kidneys and other tissues, as readily recognizable crystals. When deposited in bone, the calcium fluoride makes the latter white, harder and more brittle. Unlike oxalic acid, which also combines with, and thus lowers, the available calcium in the blood, sodium fluoride also exerts an alkaloid-like reaction. In lower organisms, for example, which do not require calcium, the fluorides still exert this action; whereas, oxalic acid does not.

*Fatal dose*.—The minimum lethal dose is not known. About 4 gm. have caused death in an adult. In general, the more soluble the fluoride the greater is its toxicity; but fluorine content is an equally important factor. Sodium fluosilicate ( $\text{Na}_2\text{SiF}_6$ ) for example, used widely as a rat poison, is much less soluble than sodium fluoride, but, when adjusted to fluorine content, the toxicity is approximately the same. As little as 0.2 to 0.7 gm. of sodium fluosilicate have caused death in adults.<sup>23</sup>

*Fatal period*.—Though the salts tend to act more slowly than hydrofluoric acid, death has resulted within 5, 10 and 15 minutes,<sup>6, 24, 25</sup> but periods of 10 to 12 hours have been noted. In the case cited above, death occurred in three hours. The average is about eight hours.

*Post-mortem appearances*.—Depending upon the degree of irritation and corrosion, the appearance of the mucosa of the stomach may vary from that of slight inflammation only to dark crimson discoloration of the rugæ, marked œdema, hæmorrhage and necrosis with marked blackening. Changes in the muscularis are, however, rare. If death has not occurred for some time, similar changes may be noted in the duodenum and jejunum. The liver and kidneys may show extensive and severe parenchymatous changes and, as stated, may contain crystalline

deposits of calcium fluoride. As much as 1.6 mgm. of  $\text{CaF}_2$  per 100 gm. of soft tissue has been found in a fatal case, compared with the "normal" 20 to 80 micrograms.<sup>26</sup>

*Signs and symptoms.*—As a rule, the initial signs and symptoms are produced by the corrosive action of the poison—burning sensation in the mouth, dysphagia, great thirst, salivation, abdominal pain, nausea, and vomiting. As the corrosive effects become more marked, there is diarrhoea; the vomitus and faeces may contain blood, and death may result from shock; but, as in the case cited above, the dominant signs and symptoms may be those of a lowered blood calcium—stiffness of muscles, paralysis of the facial muscles, inability to talk, inability to walk, classical low-calcium tetany of the hands and feet, epileptiform convulsions, etc. Death may then occur from asphyxia due to fixation of the respiratory muscles. In a series of 34 cases, convulsions occurred in 11, approximately 33%.<sup>24</sup> Fluorides also have a direct toxic action on heart muscle and thus may reduce the blood pressure, independent of shock, and cause death from heart failure.

*Treatment.*—Administer lime water immediately. Then wash the stomach thoroughly with lime water. If lime water is not available, a weak solution of calcium chloride (one teaspoonful to a quart of water) is equally effective, but is an irritant. If neither lime water nor calcium chloride is available, use milk. If water only must be used, the stomach should be washed *repeatedly* with *small* amounts. (The more dilute the poison—the lower the osmotic pressure—the more rapidly does the poison leave the stomach and, therefore, the greater is the danger of its being absorbed into the system).

Inject slowly 10 c.c. of a 10% solution of calcium gluconate intravenously and repeat the injection without delay on appearance of any signs suggestive of tetany (see above). If calcium gluconate is not available, a 10% solution of calcium chloride may be used, but the latter must be injected *very slowly*. Calcium gluconate contains about 9% only of calcium; whereas, calcium chloride contains about three times as much. With the latter, therefore, there is a greater danger of a high concentration of calcium reaching the heart and thus producing cardiac syncope. Calcium chloride also irritates the veins more than the gluconate. *Never inject calcium chloride into the subcutaneous tissues.* It should be noted here also that the injection

of calcium tends to cause vasodilatation. It, thus, also tends to lower blood pressure and precipitate shock or aggravate it; but the danger is much less than the danger from the effects of the poison.

To prevent shock from severe pain, administer at once 1/6 grain morphine intravenously. Treat any shock present very energetically. Place the patient in a head-low posture and administer oxygen for *any* degree of cyanosis. Inject intravenously 50 c.c. of a 50% solution of glucose; then, by a continuous drip, inject one to two litres of a 10% glucose solution at a rate of 2 to 10 c.c. per minute; depending upon the degree of shock. Unlike "traumatic" shock, direct cardiac stimulants may be useful, because of effects of the poison on heart muscle. Do not use adrenalin, which tends to aggravate shock by causing further capillary dilatation. Caffeine-sodium-benzoate (7½ gr.) intravenously is useful.

After the stomach has been washed thoroughly and the necessary measures have been taken against tetany and shock, milk and egg white should be administered and continued at frequent intervals during the first 48 hours; also, calcium lactate (about 5 gm.) every four hours combined with twice the quantity of lactose, which it appears enhances the antispasmodic action of calcium.

*Detection of poison.*—Though it is not the purpose here to deal with this aspect of fluoride poisoning, an experience some time ago is of interest. During the preliminary distillation of the suspected material, after acidification, the entire distilling apparatus, flask and condenser, suddenly became opaque with a frost-like coating. What had happened was that the acid used to acidify the mixture combined with the fluoride and thus produced hydrofluoric acid which etched the glass. The fact, therefore, that the suspected material contained a fluoride became obvious immediately.

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Medical Arts Bldg.

## MENTAL ILLNESS AND THE PRINCIPLES OF MEDICINE

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THE human being in action is conditioned by physical, psychological and constitutional factors. Each individual inherits certain psychophysical tendencies or trends on which mental and physical stresses are continually acting. The health of the individual depends both on the relative strength of these constitutional factors and the environmental factors acting upon them. In the realm of mental disorder two individuals may be faced with apparently the same series of psychological and physical challenges, yet one may break down while the other may adjust satisfactorily. This would indicate that the constitutional factors were the determining ones. Again, if two individuals of equal constitutional robustness are confronted by physical or psycho-

logical strain, ill health will be determined by the strength of the environmental stress. Therefore in every case these three aspects must always be assessed. The omission of any one in the investigation of a case may lead to a wrong diagnosis and management.

It is necessary to guard against an initial prejudice in favour of any one of these factors. Mental symptoms may so dominate the clinical picture that they tend to mask a possible underlying physical disturbance with the result that the physical aspect not infrequently is the one to be omitted in the assessment of a mental illness. To illustrate this point, to emphasize the interaction and importance of all three determinants, and to show that mental illness and its investigation complies with the general principles of medicine, the following cases are presented:

### CASE 1

This man, aged 41, was admitted to the Toronto Psychiatric Hospital on a magistrate's warrant. His manner had been peculiar for some time. He had finally struck his wife. On the advice of the physician she laid a charge of assault. On admission he appeared confused, unsteady and acted as if intoxicated. Memory for recent events was poor. He was untidy and would get out of bed and urinate on the floor. At times he would complain of severe headaches, sudden in onset and offset.

Investigation of this man's past history indicated he had been well adjusted, jolly, happy-go-lucky and had had many friends. He was working as a florist's assistant until December, 1935 (14 months previously) when he had a difference of opinion with his employer regarding overtime and was given a week's pay and discharged. He could not find work and developed moody spells and would sit by himself for long periods. His behaviour would frequently be silly; he would laugh for no apparent reason and when questioned would make irrelevant remarks. In August, 1936 (i.e., 6 months previous to admission) it was noticed by the patient's family that his "eyes turned in" and the patient complained of seeing double. His mental symptoms became more pronounced, he brooded, and would sit staring into space. Since October, 1936, he often cried out, "My head, my head", and then would laugh. The last few weeks previous to admission, patient stated that he expected the devil daily at 3.00 p.m. He thought people were outside the window. He complained of crawling feelings up the back of his head. He misidentified relatives and his wife became afraid of him and finally laid a charge of assault when he slapped her.

*Examination.*—Internal strabismus of the right eye. Pupils reacted, but right sluggishly. Question of slight weakness of right grip. Inclined to fall to right. Badly choked optic discs. No other neurological signs. Urine showed one plus sugar. Hæmoglobin 98%; temperature 97 to 98°; pulse 80 to 84; blood pressure 100/70; Wassermann and Kahn test negative.

A frontal lobe tumour was suspected and patient was transferred to the Toronto General Hospital on February 18, for operation. The surgeon found a large meningioma (the size of an orange and weighing 105 grams) in the midline about the frontal region and growing from longitudinal sinus and falx and impinging on both frontal lobes. Patient did not survive the operation.

Meningioma is the most favourable type of tumour to remove. This case especially illustrates how mental symptoms can be so prominent as to mask the fundamental nature of a condition. An early careful examination might have indicated the organic lesion. In reviewing the case it would seem that there were several signs suggesting the possibility of an underlying organic condition: (1) Striking personality changes, a year prior to admission, in a man of previous stable personality. (2) Six months before admission strabismus and double vision. (3) Complaints of sudden and severe headaches of short duration and not typical of psychological headaches. (4) Memory defect for recent events should always make one suspect an organic lesion. (5) Finally the choked discs made the diagnosis obvious.

## CASE 2

This patient, aged 32, came to hospital voluntarily, December 16, 1941, stating that she felt that there was something the matter with her and wished to get her difficulties straightened out. She expressed paranoid ideas, that many men were especially interested in her, and that her employer was in love with her, had hypnotized her and had sent electric currents through her. This embarrassing situation had led to her dismissal. On admission she was untidy, pre-occupied and seclusive. At times she would talk at length about her difficulties with men, but often her conversation would be rambling and disconnected. Physical examination revealed no positive findings. The pupillary and all other reflexes were normal.

This patient had always been very quiet, reserved, sensitive and was not a good mixer. There was a history of a love affair in 1937 and again in 1939. She had had a rash in 1937 but had her blood examined which was said to be negative.

In August, 1941, she began to develop the symptoms which led to her dismissal in September, 1941. She was very upset about this and said that it was for political reasons. She kept writing to the manager asking him to straighten out the situation. In addition she read books on psychology and hygiene as she felt that there must be something the matter with her. Later she consulted a doctor who had her admitted to the Toronto Psychiatric Hospital.

This history and the lack of physical findings, suggested a paranoid schizophrenic reaction. However, on December 20, a blood examination gave a positive Kahn reaction. A lumbar puncture was then done and the cerebrospinal fluid gave a 4 plus Wassermann, 2 plus Kahn, 52.5 mgm. % protein, and the colloidal gold reaction was 4432210000.

In view of these serological findings it was felt that this case was essentially one of paresis, without, as yet, the physical abnormalities which are usually present in paresis. It would appear in this case that the specific infection had precipitated a schizophrenic reaction in a girl who had

always been a quiet, sensitive and reserved individual. The progress of this patient under treatment is interesting. Fever therapy was begun March 3, 1942, and by April 2, 1942, all symptoms had disappeared. She had become tidy in her appearance, mixed readily with others and showed good insight into her condition.

## CASE 3

This man, aged 63, was admitted to the Toronto Psychiatric Hospital on October 9, 1939, as a case of mental depression. His history indicated that previous to his present illness he had been a well adjusted individual, always pleasant and had had a steady work record. For the past two years he had had an increasing amount of financial worries in connection with property and mortgages. Business had been poor and for the past year there was some danger that he might lose his home. He was perfectly well until March, 1939, except for loss of sexual desire during the previous two years. In March he commenced to feel tired, lost weight and felt unhappy. He lost about 40 lb. in weight from March to October, noticed an increased thirst and hunger and had polyuria. His tongue also felt dry. He worked until September, 1939, when he was too tired to drive his truck. He kept talking about his financial worries and began to worry over even trivial matters. He was restless, agitated, confused, refusing to eat. On September 29, he became violent towards his wife and daughter and he himself suggested he should be put somewhere before he did harm to anyone. As his mental condition failed to show improvement he was admitted to hospital.

On admission he appeared quite depressed and moderately confused. There was an odour of acetone on his breath and the urine showed 4 plus sugar, ketones and many pus cells. Fasting blood sugar was 167 mgm. %. His tongue was dry; the thyroid was diffusely adenomatous. There was no tachycardia, tremors, intolerance of heat or eye signs. Basal metabolic rate was + 12%. The prostate was enlarged.

On October 12, he was put on a diet of protein 65 gm., fat 100 gm., carbohydrate 120 gm. By October 16 he was not confused but still definitely depressed. A glucose tolerance test on October 17 gave a fasting level of 187 mgm. %, half hour 300 mgm., one hour 276 mgm., two hours 245 mgm., three hours 156 mgm. % with four plus sugar in the last 3 hours. On October 18, 10 units of ordinary insulin, twice daily, was started. From October 18 he improved rapidly, becoming less depressed and more alert. By October 23 he seemed perfectly well mentally. Glycosuria varied but was often absent. No ketones were present. The fasting blood sugar remained at a high normal, being 148 mgm. % on discharge October 28, 1939.

Here was a man who probably had had mild diabetes for an uncertain time, probably at least two years, and for the last six months was beginning to show clinical signs with thirst, hunger, polyuria and loss of weight. It is to be noted that for two years he had had progressive financial worries and by September, 1939, he had obviously become pathologically depressed.

A mild diabetes can be aggravated by infection and by trauma, physical or psychic. Thus his



chronic worry probably precipitated a more severe diabetes, which in its turn even without acidosis, lowered his sense of well being and his ability to assess and cope with his worries. This vicious circle was interrupted by treatment of his diabetes.

#### CASE 4

This man, aged 52, was admitted March 9, 1941, in a very excited resistive condition, tossed violently about and his conversation was incoherent. Even with heavy sedation he had very little rest. Investigation of history indicated he had always been a quiet, well adjusted man with a steady work record. Four weeks before admission he had had a head cold but was working until March 8 when he came home at 2.00 p.m. complaining of a violent headache. He lay down and slept until 6.00 p.m. At 9.00 p.m. he became restless, talked incoherently and vomited. He was given a hypo and slept until 3.00 a.m. March 9. Upon awakening he became progressively more restless and disturbed. He frequently held his head and would get up on his hands and knees with his head down. He was becoming so uncontrollable that it was necessary to admit him to hospital. Chief points on physical examination were a very stiff neck, the right pupil slightly larger than the left and both reacted poorly to light. His blood pressure was 190/120, his temperature was 99.2°, pulse varied from 64 to 120, and respirations were 20 per minute. The white blood count was 5,900. The possibility of subarachnoid hæmorrhage was considered and a lumbar puncture was therefore done. The cerebrospinal fluid was turbid but no blood was present. Pus cells were abundant and Gram-negative diplococci were present. He was at once transferred to the Isolation Hospital where he died March 13, in spite of intensive chemotherapy.

This case, to the attending physician and when admitted, suggested an acute manic reaction. However an organic disease was indicated by the history of acute headache, the stiff neck and the unequal and sluggish pupils. The diagnosis of meningitis was made by examination of the cerebrospinal fluid.

#### CASE 5

This man, aged 55, was admitted to the Toronto Psychiatric Hospital complaining of loss of appetite, pain in the abdomen, weakness and was moderately depressed. No physical cause had been found for these complaints which had been present for about five years. The first symptom, pain in the epigastrium, had occurred following an attempt to lift a motor car out of the ditch. He consulted many physicians and was in hospitals for investigation on numerous occasions, but no satisfactory explanation was ever discovered. X-ray examinations of the spine, genito-urinary system, gastrointestinal tract, including the gall bladder, were repeatedly negative. There had been elevations of temperature on occasions from 100 to 102°. During this time he had lost weight, had a poor appetite, often refusing to eat, vomited frequently and was continually complaining of abdominal pain and distress for which he insisted on being given codeine. Because of his continual complaining and the lack of any physical findings to explain it, it was considered that his condition was one of advanced psychoneurotic invalidism. On admission he was an emaciated man weighing 78 lb. He complained a great deal of abdominal pains and frequently asked for relief of this. His appetite was poor. Beyond his complaints and being mildly depressed he showed no other mental symptoms. Complete physical examination

revealed no abnormalities, except that his knees were almost ankylosed from being continually in bed. The temperature over a period of eight weeks was estimated simultaneously by mouth, axilla, and by rectum and showed no elevation. The pulse rate averaged about 80. The blood pressure was 108/60. There was no cough or sputum. The hæmoglobin was 75%; white blood cells 5,200; urine normal; blood Wassermann negative.

The fact that this man had been complaintive and had been apparently sorry for himself over a period of years in the absence of positive physical and laboratory findings, which were done repeatedly, was suggestive of psychoneurosis. In addition, investigation of his history revealed that he had lost considerable money about a year previous to the onset of his illness and two years later his only daughter had married and he had been alone since then. However his history previous to this illness had shown no evidence of instability and during his stay in hospital, although he continued to complain of epigastric distress, he co-operated so well and showed so little of unwholesome or morbid trends that psychoneurosis as a diagnosis was not entirely satisfactory. Up to June 2, an x-ray of the chest was not done because the patient was bedridden, and curiously enough x-ray of the chest was never done previously. A film of the chest on June 2 revealed moderate to far advanced pulmonary tuberculosis. This finding satisfactorily explains the onset and course of the illness and also illustrates how the symptoms of a physical illness may simulate a psychoneurosis. This case also shows the risk of diagnosing psychoneurosis by exclusion. It is quite possible however that the psychological factors may have played a significant rôle in adding to the symptomatology.

#### CASE 6

This patient, aged 32, was admitted to hospital June 24, 1943, being very talkative, excited, euphoric, unco-operative and irritable. She was extremely distractible, made personal remarks, and presented the general picture of a manic reaction. There was no evidence of hallucinations, delusions or disorientation. All her physical findings including neurological were negative except for a slight slurring of speech at times which was considered to be due to heavy sedation.

Investigation of this girl's history indicated she had always been quiet and friendly and had shown no untoward behaviour. About six weeks before admission she had some teeth extracted following which she complained of being extremely tired at work. Two weeks before admission she caught a cold, one of the infected teeth was draining and she had an elevation of temperature. She became restless, talkative and excited, and her behaviour became so noticeable that her employer thought that she was intoxicated. Three days before admission she became quite argumentative, would go out on the street and talk to people, and finally became unmanageable, smashing lamps in the house and was so noisy and destructive that it was necessary to admit her to hospital.

A routine examination of the blood revealed positive Wassermann and Kahn reactions. A spinal puncture was then done and the fluid showed 36 cells, protein 89.5 mgm. %, a positive Wassermann and Kahn and the colloidal gold reaction gave a paretic curve of 5554332100.

This case exhibited the symptoms of the manic phase of manic-depressive psychosis. It would appear that the syphilitic infection, possibly aggravated by the infected teeth and their extraction, precipitated a manic psychosis. The absence of structural neurological findings and the absence of mental deterioration were probably due to the early stage of the disease. Fever therapy was started on August 10, 1943. Patient began to show improvement in September, 1943, and was discharged from hospital, October 23, 1943, appearing fully recovered, being quiet and pleasant, sleeping well and displaying good insight.

#### CASE 7

Two weeks before admission to the Toronto Psychiatric Hospital this patient, aged 43, developed definite mental symptoms. She woke at 1.00 a.m. claiming people were trying to get in to search the house. Later she told friends that police were going to search the house. Since then she became unusually quiet and slow in her movements. On June 13, she told her husband that someone was trying to steal a dollar from her purse. Then she became restless and fearful. On June 14 she woke at 3.00 a.m. and insisted there were two men and a woman on the back porch. The next day she complained of being in a daze and very tired. She was taken to a general hospital but was very resistive, refusing food and struggling with the nurses. She was considered to be a case of involutional melancholia, and it was thought necessary to admit her to the Toronto Psychiatric Hospital.

On admission she was confused, very quiet, somewhat resistive. At times she was very lethargic and appeared mentally retarded. She admitted auditory hallucinations and would become apprehensive and said she wished to see a detective about some private business. She was rather pale with a high flush on the cheek. The skin was dry and there were irregular exfoliating plaques on both forearms. There was some non-pitting oedema of the eyelids, hands and feet. Hair was coarse, the lips had a smooth coral colour, voice was hoarse. No thyroid enlargement was present. Temperature was 98°, and pulse 88. The haemoglobin was 61%, 2.9 million red cells, 8,000 white cells and a smear showed red cells large and well filled, a few microcytes and aniso and poikilocytosis. The non-protein nitrogen was 35 mgm. % and a Van den Bergh 0.2 units. Wassermann test negative.

These physical findings in the skin, with the pallor, hoarse voice, malar flush, coarse dry hair, smooth coral lips, and the slowness of mental activity indicated typical myxoedema. A basal metabolism June 24 read - 42%.

Further investigation of the history indicated that the patient was a well-adjusted individual in the past. For the last three years she had had a great deal of worry over an irresponsible daughter who became pregnant before marriage and soon after marriage had two more children in rapid succession. In April, 1943, following the enlistment of her son-in-law, this daughter and her two children came to live in the home. Just prior to this the elder child had become ill with otitis media and a facial paralysis and had to go to hospital. Before she was well the patient's daughter had entered

hospital for her last confinement. The patient had a great deal to do managing the house, visiting the hospital and later looking after both convalescent patients when they were able to leave hospital. The home situation became quite disturbed with the introduction of three children who were noisy and badly trained. In addition to these duties she refused to give up her outside activities in spite of the fact that she felt more and more fatigued. This symptom was part of a progressive state of ill health over the past two years in which there had been a gain in weight, menorrhagia, anaemia, oedema and a gradual slowing of activity. It was not until two weeks before admission that serious mental symptoms developed as stated above.

Desiccated thyroid gr. ½ was given daily beginning June 25. In about two weeks the skin was less dry, the myxoedematous patches on the arms were disappearing and the patient was brighter and free from any psychiatric symptoms. The basal metabolism had risen to - 31%. She was discharged July 14 much improved in every way.

It was felt that this woman probably could have handled her difficulties had she been well, but with a progressive state of hypothyroidism there was a gradual depletion of both physical and mental resources until finally definite psychotic symptoms developed.

#### CASE 8

This patient, aged 59, was admitted to the Toronto Psychiatric Hospital February 8, 1938, because of a long history of physical complaints for which no organic basis could be found. The history indicated that this woman was born in India and came from a well-to-do family, had been a frail child and had always been pampered. Because of her poor health she was not allowed to go to school and was taught by a governess. She was said to be domineering and when asked to write her entrance examinations she refused. At the age of 16 she had severe dysentery and following this had considerable gastro-intestinal disturbances which lasted for two years and required a strict diet. She married at the age of 27 and there was no apparent disharmony. It was the impression however that her life was not fully satisfactory. Though the patient had a retroverted uterus repaired there had been no pregnancies. At the age of 37 she fell and injured her left arm and complained of pain in the arm and shoulder for many years afterward though no organic cause could be found. She sought many types of unorthodox treatment. In addition, from about the age of 42, that is about 17 years before admission, she began to have attacks of vomiting following meals. These symptoms occurred when she was tired or under nervous tension. For the 10 years, 1920 to 1930, she had periods when these symptoms were exaggerated, at times becoming so severe that she was unable to sleep. In 1930 she consulted an osteopath who stated that her trouble was due to aluminium poisoning from cooking utensils. He advised her to stop cooking food in aluminium which she has adhered to ever since. She felt much better after a series of lamp treatments. She was fairly well until the spring of 1937 when she began to complain of pain in her back but was improved with rest. In October, 1937, her social duties had increased and she began to complain of severe pain which began in her back and radiated around both sides of her chest. This pain was not helped by rest and at night she would sit up rocking her shoulders back and forth. By December she began again to vomit after meals. This symptom became more marked in January, 1938; she would eat very little, was sleeping poorly and complained of general weakness.

On admission she seemed fairly well nourished but was weak and frequently moved her shoulders back and forth stating that it relieved the pain. She would talk at great length about illnesses she had had and appeared



convinced that her present symptoms were due to aluminium poisoning. She thought it was safer not to eat because it tended to increase her sickness. She continually praised her husband and appeared anxious to give the impression that she did not feel any jealousy over the fact that her husband placed his work before herself. She seemed convinced that she had never been able to be as good a wife as her husband deserved, and it appeared obvious that she had always been a worrier. Physical examination was essentially negative though the patient vomited frequently after meals and continued to complain of pain in her back and chest.

In view of this history of a woman who had a pampered childhood and an inadequate adult and married life with a long history of physical complaints for which no organic cause had been found, it was considered that the whole picture was that of a psychoneurosis. Although this patient's complaints did not suggest an organic disease it was thought advisable that a gastrointestinal x-ray should be done to rule out any possible structural cause for the symptoms. This revealed a much scarred duodenal ulcer on the posterior wall with an obstruction amounting to an 80% residue in the stomach at the end of six hours. This case illustrated the fact that when organic disease does occur in psychoneurotics it can be easily overlooked.

#### CASE 9

On admission this patient, aged 37, was excited, actively hallucinated and in extreme fear. He was very restless, attempting to jump out of bed and felt that patients and staff were trying to shoot him. He refused food, fearing poison. He was thin, skin was moist, the pulse rapid (120), the eyes showed exophthalmos and pronounced lid lag. There was much vaso-dilatation, fine generalized tremor, large hyperplastic and adenomatous thyroid. The heart was regular with a short sharp systole.

The previous history of this man indicated that he had always been a stable individual, pleasant and a good mixer. He had had a steady work record. During the past two years he had been losing weight, tiring easily and perspiring a good deal. A physician examined him on September 12, 1934, and made a diagnosis of hyperthyroidism and he was admitted to a general hospital. On October 17 he became excited and apprehensive, feared poisoning and made attempts to escape from the hospital. He was then admitted to the Toronto Psychiatric Hospital on October 24. He was placed on Lugol's solution 10 minims twice a day, in preparation for thyroidectomy, and in three days he had become quiet, there was no apprehension, no hallucinations or delusions, and he was sleeping well without sedatives. He was quite lucid and gave a clear history and had complete insight into his condition. He was operated on in two stages after 10 days of pre-operative Lugol's solution and made a good recovery. His mental state remained satisfactory.

This man's mental condition was the result of thyrotoxicosis and is typical of a delirious state. There was no difficulty in diagnosing this particular case, but often an anxiety state is mistaken for hyperthyroidism. The important point is that the diagnosis rests mainly on clinical

experience. There are, however, a few points of special significance. Although it is said that a sudden emotional shock may precipitate hyperthyroidism, this is probably rare. In an anxiety state the onset of symptoms usually coincides with some emotional stress. As in hyperthyroidism the effect is expressed through the autonomic nervous system and therefore rather closely resembles it. In an anxiety state the tachycardia is not persistent throughout the 24 hours. Basal metabolic rate readings may be elevated in anxiety states but these metabolic rates are not actually basal. In addition the readings vary greatly and some will probably be within the normal range. Sedation tends to lower the readings to normal in anxiety states, but not in hyperthyroidism. Lastly, the presence of an enlarged thyroid gland does not necessarily mean that it is physiologically abnormal.

#### CASE 10

This man, aged 61, was admitted to hospital in a semicomatose condition, hallucinated, fearful, very restless and talking incoherently. This condition was the culmination of a four months' illness which began in September, 1940, with dizziness, loss of appetite, tiring easily and frontal and temporal headaches. For the past two months he had to stay in bed for a few days at a time. For two weeks prior to admission he had frequency of urination both day and night, more severe headaches, vomiting, and difficulty in remembering things. He was admitted to a general hospital January 11, 1941, because of mental confusion. He became acutely disturbed, would hide behind chairs and under the bed, thinking he saw animals in the room. It was felt that he could not be managed in a general hospital and he was admitted to the Toronto Psychiatric Hospital, January 13, 1941, as a strictly mental case, but undiagnosed.

Physical examination revealed blood pressure 130/60, Cheyne-Stokes respiration, temperature 100.6° (rectal) but no other obvious positive findings. Urinalysis showed a specific gravity of 1.010, one plus albumin and occasional granular and cellular casts and white blood cells. Blood non-protein nitrogen on January 14, three days after the onset of mental confusion, was 171 mgm. %. Blood sugar 114 mgm. %. Three days later non-protein nitrogen was 119 mgm. % with a concurrent improvement in his mental state. He was becoming less confused, quieter, and talking more rationally. By January 18 there were no mental symptoms except inability to remember events of the few days before admission. By January 20, he was quite clear in his thinking, was pleasant, co-operative and in touch with his surroundings.

Non-protein nitrogen January 22, was 40 mgm. %. A two hour kidney function test showed a fixation of specific gravity between 1.005-1.009, and blood pressure 150/80.

In reviewing this man's case, it was noted that he had always been a quiet stable individual who had worked steadily and efficiently at the occupation of fur designer all his life. Therefore his recent behaviour was completely foreign to his usual behaviour. Though there was pre-

ceding ill health with fatigue on exertion and frontal and temporal headaches (unusual symptoms in this man with no coincidental worries), the mental symptoms developed suddenly after a few days of urinary frequency, severe headaches and vomiting. These mental symptoms of confusion, visual hallucinations and fear coming on as a climax to four months of deteriorating health strongly suggested toxæmia affecting cerebral function. This was substantiated by the urinary findings and the very abnormal blood chemistry which was an indication of renal insufficiency. It was interesting to note that the patient's mental state paralleled and improved with the falling non-protein nitrogen. The condition was finally considered to be a toxic cerebral state due to uræmia.

## CASE 11

This patient, aged 55, was admitted February 10, 1943, because she had become confused, and was extremely apprehensive, suspicious, and was "hearing voices and sounds" (auditory hallucinations) which terrified her. This woman had always been a happy stable individual previous to her present illness. Two years before admission she consulted a doctor, because of general fatigue and a hypertension (blood pressure 235/135) was discovered. In the week of January 25, 1943, she had a dizzy spell and again consulted a doctor. Her blood pressure was 250/140. He gave her potassium thiocyanate gr. ii t.i.d. and h.s. beginning January 29. By February 8 she had become confused, tearful and was unable to talk clearly. Her blood pressure was then 185/115. Cyanate was discontinued February 8, but her mental condition became worse. Her conversation became jumbled, she would shout out, thought she was dying and that attempts were being made to poison her. She thought she saw devils and said she could see her parents (both of whom were dead). She accused her nurse of filling her with electricity. She refused her food and became so unmanageable that it was necessary to admit her to hospital on February 10, 1943.

On examination the blood pressure was 140/88, the heart was enlarged but there were no signs of heart failure. Heart rate was 80 with a regular rhythm. The urine contained two plus albumin, no casts were seen and the specific gravity was 1.024. Because of the obvious delirium it was thought that her condition was toxic and her blood was therefore examined for cyanate, bromide and non-protein nitrogen. There were 20 mgm. % of cyanate (12 mgm. % or over of cyanate is considered a dangerous level), 73 mgm. % non-protein nitrogen and no bromide in the blood. The blood cyanate value gradually fell, being 12 mgm. % on February 22 and 2 mgm. % on March 3. The non-protein nitrogen returned to normal by February 22. Up to February 15 the patient continued to be very noisy, extremely restless and delirious. After this there was definite improvement which continued with a few lapses but by February 28 she was completely free of any mental symptoms. The blood pressure was followed throughout and showed great variation, between 140/85 to 196/112-104. For the week before discharge (March 6, 1943) the blood pressure was 180-190/100-120.

This case illustrates the delirium caused by an excessive accumulation of cyanate in the blood in the treatment of hypertension.

## CASE 12

This woman, aged 26, was admitted to the Toronto Psychiatric Hospital November 3, 1937, because of mental illness. On admission she was drowsy, her remarks were irrelevant and incoherent and she appeared hallucinated and disoriented. She was dehydrated, would not take food and had to be fed by gavage.

In this patient's history it was noted that she had always been an immature individual who overreacted emotionally to difficult situations. During the last week of September, 1937, she was thrown from her horse and suffered an injury to the lower part of the back. She continued to complain of soreness of the back and was admitted to a general hospital for investigation. She appeared "very restless and nervous" and the attending physician prescribed a bromide mixture containing gr. xxv to the dose. She received three doses a day. In about three weeks she had become irritable, drowsy and impulsive and it was thought that she could no longer be managed in a general hospital.

In view of the fact that this patient had been receiving bromides and that her symptoms suggested a delirium, a blood bromide was estimated on November 5, 1937 and found to be 400 mgm. %. Patient received no bromide following admission and only occasionally received nembutal. Within a week she showed gradual improvement, becoming less confused and disoriented. By November 15, 1937, she appeared completely recovered, was clear in her thinking and displayed insight into her condition. This improvement coincided closely with the fall in the blood bromide which was 235 mgm. % on November 11, and 80 mgm. % on November 21. She was discharged from hospital December 7, fully recovered.

This woman's previous personality led the doctor to believe that she was overreacting (which she probably was) to her accident, and that this overreaction had eventually become a psychotic state. The symptoms of delirium and the very high bromide content of the blood indicated however that she was suffering from bromide intoxication. This was further substantiated by the rapid improvement which paralleled the fall in blood bromide. It is not uncommon for individuals who are fundamentally emotionally unstable to show toxic symptoms from drugs, especially from bromide. That is to say, the constitutional factor in the toxic psychoses plays a prominent rôle. Mental symptoms from overdosage by bromide occur with sufficient frequency that it has to be kept in mind whenever this drug is used.

## DISCUSSION

The cases quoted were sent to a psychiatric hospital because they showed mental symptoms which were so prominent and of such a nature as to simulate the well known functional mental syndromes of schizophrenia (case 2), manic state (cases 4 and 6), depression (case 3), psychoneurosis (cases 5 and 6) and involutional melancholia (case 7). Cases 10, 11 and 12 were undiagnosed mental conditions. On further study in hospital a physical factor was found



to be of great importance in each case and in some cases of prime importance. For example, in case 1 there was a history of a well adjusted personality until a year before admission. From that time on this man's whole behaviour showed a change with apparently insufficient psychological factors to account for it. In addition there were definite physical signs and also symptoms both mental and physical, suggestive of an organic lesion. The general mental picture so predominated however, that the possibility of a physical factor (brain tumour) had not been considered.

A number of the cases illustrate the interplay of psychological and physical factors. For example in case 3, a mild diabetes was accentuated by financial worries. Anxiety, possibly by acting through the autonomic-adrenal-liver chain, may increase the demand for insulin by augmenting glucose liberation. This additional demand may tend to fatigue an already weakened pancreas, resulting in more severe diabetes which in turn produces a loss of strength and lack of energy which thus contributes to the feeling of depression and anxiety.

Again in case 7, both psychological and physiological factors are prominent. This woman had numerous domestic difficulties which she probably would have been able to cope with but for the fact that the progressive hypothyroidism decreased cellular efficiency. This decreased efficiency applies to central nervous system cells as well as to all other cells and is a deficiency in quality as well as rate. The total organism was then no longer able to adjust satisfactorily to the environment. Supplying the deficient hormone gradually reversed the processes as evidenced by improved physiological and psychological functioning and the individual was then able to meet her problems adequately.

In case 8, the long history of a definite psychoneurosis tended to prejudice the observers when considering any particular symptoms in this patient. Therefore when she complained of vomiting after meals it was concluded that this was another symptom of her psychoneurotic state. The periodicity of these spells of vomiting seemed to accompany or follow periods of nervous stress. This further tended to suggest functional vomiting. It is well known, however, that psychological strain can also hasten the appearance of the symptoms of an organic lesion or magnify any symptoms already present.

This is especially prone to occur in the disorder known as peptic ulcer which is considered by many to be fundamentally a constitutional physiological defect. The precipitation of the results of this defect takes place under varying circumstances. First; the defect may appear as a spontaneous rhythmic phenomenon of relatively short duration, disappearing without treatment and apparently very little affected by environmental factors either physical or psychological. Second; it may appear following physical trauma, for example, after excessive dietary indiscretions. Third; the symptoms would seem at times to be precipitated by emotional tension which acting via the autonomic nervous system modifies secretion of acid, gastric and duodenal motility and also may alter capillary blood flow and thus may disturb the health of these potentially defective cells. Thus in the etiology of peptic ulcer as in the etiology of all disorders of the organism, constitutional, physical and psychological factors are invariably present in every case, though they may vary greatly in their practical importance. The constitutional factor in peptic ulcer is probably always the most heavily weighted. This would appear to be illustrated by the fact that many individuals suffer from severe physical and emotional stress and although some of them may develop functional dyspepsia, many never develop ulcer.

There are various ways in which the physical factors play their rôle in modifying the mental health of the individual:

1. The brain itself may be damaged by infection, as in syphilis (cases 2 and 6) and meningitis (case 4), by chemical intoxications (exogenous, cases 11 and 12, endogenous, cases 9 and 10), by cerebral vascular accidents, by pressure from tumours (case 1), resulting in actual malfunction as evidenced by mental symptoms. The final symptom-complex, however, is often determined by the inherent personality pattern. For example, cases 2 and 6 are both syphilis of the central nervous system of the G.P.I. type, yet one showed a picture of schizophrenia and the other that of a manic state. The earlier damage to the brain tends to uncover the individual's more fundamental behaviour trends. That is, the cortical cells which are more sensitive to damage are first to show malfunction with consequent release of phylogenetically older levels. As the damage increases, more and more primitive behaviour is revealed.

2. Physical conditions such as tuberculosis, anæmia, cancer, diabetes (case 3), myxœdema (case 7), etc., by lowering the general well being of the individual make it more difficult for him to solve such problems as may arise, and therefore may tend to favour the development of mental ill-health. The form the illness takes depends largely on the psychological makeup of the individual. Thus, not only is an organ or a system involved in a physical condition but also the total personality.

3. A physical illness may be a refuge and an escape from duty or difficult situations. The symptoms of the illness may therefore be incorporated unconsciously into a psychoneurotic reaction, which thus becomes a pathological solution of the problem after the organic condition has returned to normal.

4. The knowledge of the presence of a physical illness and all the implications it entails, e.g., cancer, syphilis, rheumatoid arthritis, etc., may in itself be a cause of severe anxiety. This in turn may have a deleterious effect on the progress of the illness.

Although the importance of physical factors in mental illness has been stressed, it was not intended to lay the emphasis on this or any other factor. No judgment on the interplay of psychological, physiological and constitutional factors should be made until all the possible facts of each have been discovered. Frequently there is a tendency to stress the psychological almost to the total exclusion of the physical aspects of mental illness. This is just as illogical as stressing the physical aspects or even the constitutional to the neglect of the psychological essentials.

Emotional factors are less tangible than physical factors, but nevertheless are very real and dynamic in their effect on physical and mental health. Grief, hate and anxiety (due to domestic difficulties, trouble at work, thwarted ambitions, financial reverses or uncertainty, religious questions, sexual conflicts, the weight of public opinion) by acting through the autonomic-endocrine system, may effect every cell and tissue of the body. Operating over an extended period they tend to modify the physiological processes and the behaviour of the whole organism, thus favouring the establishment of a pathological state. This has already been pointed out in several cases, notably in the diabetic (case 3), and in the peptic ulcer (case 8). This mechan-

ism is frequently seen in medical problems and may operate in every type of physical or mental illness. It is especially prominent in the allergic disorders (for example: asthma, angioneurotic œdema and eczema) which are disturbances of the vegetative nervous system. Among other examples are essential hypertension, mucous colitis, and the menopausal state. It is therefore important that the personality development and the life situation be understood in order to appreciate the presenting symptom-complex in its proper perspective. Thus the significance of a "gastric neurosis", "cardiac neurosis", general weakness and exhaustion, or a headache, does *not* lie in the abdominal pains, chest discomfort and palpitation, the heavy and exhausted sensation in the limbs or the pain in the head, but in *the anxiety* over financial matters (for example) or over some other feeling of insecurity or conflict. The locality of disturbed function may be important to the patient but is really only of academic interest. Many patients, in whom physical symptoms are prominent, have been given tests, unnecessarily exhaustive, designed to reveal structural or organic disease, without any consideration being given to the possibility of emotional factors which were obviously the cause. That is to say, preoccupation with the organic blinds one to the psychological.

The psychological aspect may not only be important in the genesis of an illness, but can be a powerful influence during the course of the treatment. Every form of therapy, whether drugs or surgery has a strong psychological value which may tend to enhance recovery. Again, the personality of the physician always enters into the situation, having either a beneficial or an adverse effect and may be of tremendous importance.

Further, many a psychoneurosis owes its beginning to suggestion; either a wrong diagnosis, or a faulty explanation by the physician. For example, many a person has become an invalid because of a physiological heart murmur which was interpreted by the physician and explained to the patient as a serious heart defect.

It is imperative that the psycho-physical mechanism which produces the symptoms should be explained to the patient in simple terms, otherwise he may be left with the impression that his complaints are imaginary. This explanation of the cause, and also the removal of the psychological factor (for example a domestic



situation) is absolutely essential for recovery. In addition the patient has to understand fully how he has an active part to play in the readjustment of his life and his point of view. The accomplishment of these changes is the art of psychotherapy.

No assessment of an illness is complete without the consideration of the importance of the life epochs in which psychological and physiological stresses are increased. Puberty and adolescence, climacteric and senescence present their special problems of tissue change and new psychological adjustments.

As stated in the introduction, individuals begin life equipped with different psychological and physical potentialities and tendencies known as the constitutional group of factors. Acting upon these assets and liabilities and continually modifying them are the emotional and somatic experiences occurring throughout life. In any kind of illness, the assessment of the personality is of great importance, but a difficulty often arises in distinguishing between environmental influences and the constitution, since potent environmental factors, such as training and parental example, begin operating from infancy. The problem is one of prognosis. It is necessary therefore to attempt roughly to assess the inherent trends in order to evaluate properly the etiological factors in mental illness and thus estimate the individual's chances of recovery and the possibilities of weathering future physical and psychological stresses. The further management of the case will obviously depend on this estimate. An individual who has evidently been ill equipped to withstand stress will have to modify his life in order to avoid as much as possible any severe psychological or physical strain. A family history without a liberal sprinkling of mental disorder or other evidence of instability, and a personal history comparatively free from emotional disturbances throughout childhood, adolescence and early adult life, in spite of obvious difficulties and relatively poor environment, would suggest that that particular individual has inherited a fairly robust emotional constitution. This is further substantiated if the psychological or physical stress which precipitated the mental illness has been severe or long standing.

From all these considerations it is evident that the investigation and interpretation of psychiatric conditions, like any other type of illness,

follows of necessity the ordinary principles of medicine, especially the principle of the psychophysical unity of the organism.

#### SUMMARY

A few cases selected from a large number have been presented in which mental symptoms were so prominent that the cases were sent to a psychiatric hospital as strictly functional mental disorders of schizophrenia, manic state, depression, psychoneurosis, involutional melancholia, and undiagnosed mental illness. In only one was a physical factor suspected. During hospital investigation, in every case, a physical factor was found which was of prime importance in the production of mental symptoms in these particular individuals. The physical factors were: brain tumour, diabetes, uræmia, syphilis of the central nervous system, pulmonary tuberculosis, bromide intoxication, myxœdema, peptic ulcer with obstruction, hyperthyroidism, cyanate poisoning, and meningitis.

Constitutional, physical and psychological factors are involved in every case of mental illness.

In the application of the general principles of medicine, mental illness differs from no other.

We wish to thank Dr. C. B. Farrar, Professor of Psychiatry, University of Toronto, for permission to report these cases and for his criticism; and Wing-Commander R. F. Farquharson, R.C.A.F., Professor of Therapeutics, Department of Medicine, University of Toronto, for his helpful suggestions in the preparation of this paper.

#### RÉSUMÉ

On entre dans la vie avec un capital physique et psychologique et avec des tendances constitutionnelles qui font notre personnalité; or, cette personnalité sera sollicitée par des émotions variables, par l'entourage et par des émotions variables, par l'entourage et par des épreuves physiques de toutes sortes; par conséquent, il faudra peser les divers facteurs psychophysico-constitutionnels lorsque l'on sera appelé à apprécier l'état d'un individu suspect de troubles psychiques ou somatiques, ou des deux réunis.

L'étude d'une importante série de malades adressés à un hôpital psychiatrique permet de mettre en évidence que chez un assez bon nombre, des désordres physiques rendaient partiellement ou totalement compte du comportement bizarre du malade. Parmi ces facteurs physiques on releva des tumeurs cérébrales, le diabète, l'urémie, la syphilis nerveuse, la tuberculose pulmonaire, l'intoxication par les bromures, etc. Cette étude appuie le bien-fondé du postulat de la triple composition de l'individu, à base de facteurs physiques, psychologiques et constitutionnels. La psychiatrie est soumise aux mêmes principes généraux que la médecine.

JEAN SAUCIER

**FURTHER OBSERVATIONS ON  
EXPERIMENTAL BONE FORMATION  
WITH SPECIAL REFERENCE TO THE  
BONE-FORMING PROPERTIES OF  
THE EPITHELIAL LINING OF THE  
TRIGONE IN THE DOG\***

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IN two previous communications,<sup>1, 2</sup> we reported the results obtained after grafting mucosa of bladder, ureter, renal plexis, vas deferens, Fallopian tubes, uterus, vagina, and rectum of dogs, cats, guinea-pigs and rabbits into the rectus sheaths of animals of the same species. The following were our observations:

1. In the dog the mucous membrane of the renal pelvis, ureter, and any portion of the

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vesical mucosa, except that lining the trigone, when so transplanted, produced an epithelium-lined cyst, in association with which true bone was formed.

2. In the cat the mucous membrane of the fundus of the bladder produced a large, thin-walled cyst. Bone formation occurred, but to a less degree in each experiment than in the dog.

3. In the rabbit epithelial transplants from the fundus of the bladder produced a cyst but no bone. Other workers have obtained bone formation under these conditions.

4. In the guinea-pig mucosa from the fundus of the bladder produced epithelium, with bone formation in two cases.

5. In all species the mucous membrane of the vas deferens, Fallopian tube, uterus, vagina, and rectum produced cysts lined by a corresponding type of epithelium, but no bone.

We considered whether these different responses could be explained on an embryological basis: no bone was formed in association with epithelium derived from the Müllerian ducts; with some epithelia derived from the Wolffian ducts bone developed, and with some it did not. It seemed to us that embryological origin was not the factor which determined whether bone would or would not form.

TABLE I.  
GROUP A—TRANSPLANTATION OF TRIGONAL MUCOSA INTO RECTUS SHEATH

Dog No.	Duration of experiment	Gross appearance site of graft	Microscopic appearance graft
2	8 weeks	No sign of graft, cyst, grit, bone or fibrous tissue	Not examined
3	11 weeks	No sign of graft, cyst, grit, bone or fibrous tissue	Not examined
5	11 weeks	No sign of graft, cyst, grit, bone or fibrous tissue	Not examined
7	11 weeks	No sign of graft, cyst, grit, bone or fibrous tissue	Not examined
8	26 weeks	Cyst	Epithelial lined cyst with bone
9	26 weeks	3 mm. nodule (gritty material)	No bone or epithelium
12	14 weeks	No sign of bone, graft, cyst, grit, or fibrous tissue	Not examined
13	13 weeks	No sign of bone, graft, cyst, grit, or fibrous tissue	Not examined

TABLE II.  
GROUP B—TRANSPLANTATION OF TRIGONAL MUCOSA INTO RIGHT RECTUS SHEATH AND  
TRANSPLANTATION OF BLADDER WALL (FULL THICKNESS) INTO LEFT RECTUS SHEATH

Dog No.	Duration of experiment	Gross appearance site of graft	Microscopic appearance graft
16	20 weeks	Gritty material on both sides	Right—no bone or cyst. Left—cyst, and bone.
17	10 weeks	Nil on right side, gross bone on left side	Right—no bone or cyst. Left—cyst and bone.
18	8 weeks	Scarred tissue, both sides	Right—no evidence of cyst or bone. Left—no sign of graft.
19	15 weeks	3 yellowish nodules on right side. Nil on left	Not done.
20	11 weeks	Right—firm tissue. Left—cartilaginous-like material	Right—no bone or epithelium. Left—incomplete bone formation.











Figs. 1 and 2.—Specimen of spontaneous bone formation in pelvis of dog.

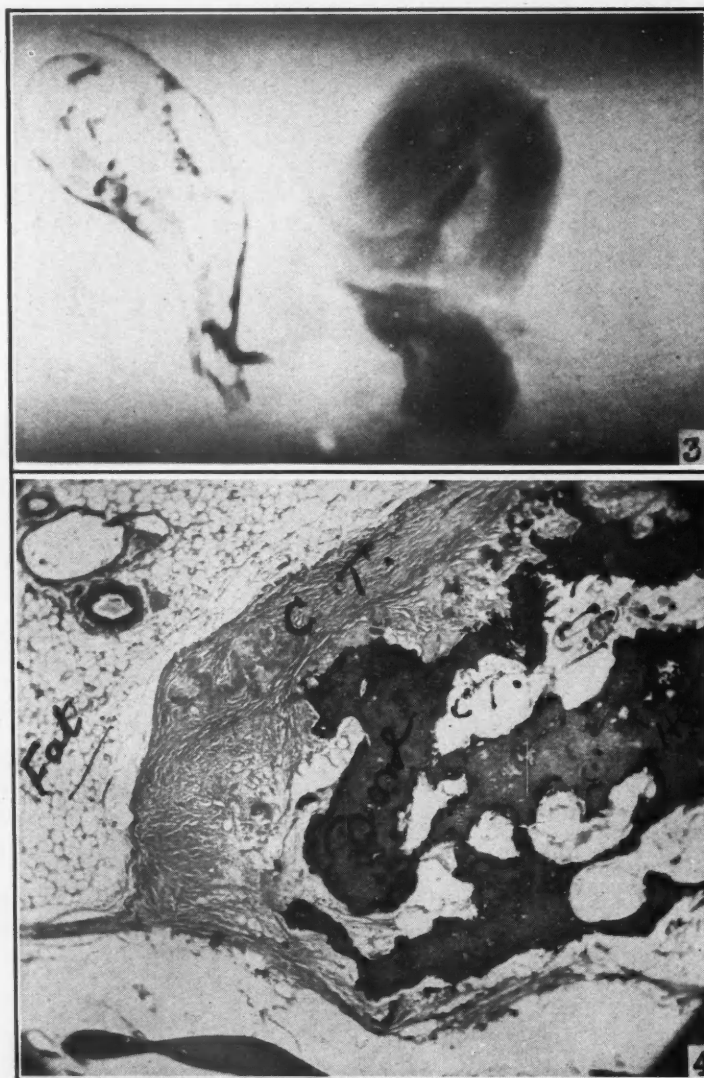


Fig. 3.—X-ray of cyst. Fig. 4.—Wall of cyst at fundus showing organized osteoid tissue with Haversian canals, interstitial system, and cancellous bone formation.









We next considered whether the different responses were related to type of epithelium. Bone developed only in association with transitional epithelium (renal pelvis, ureter, and fundus of bladder), never with columnar (vas deferens, Fallopian tube, uterus, rectum) or stratified squamous (vagina) epithelium. This seemed clear enough, but on the other hand none of our transplants of mucosa of the trigone of the bladder, which is transitional in type, developed bone. Was the determining factor then type of epithelium or something else? We decided to repeat our experiments with trigone mucosa.

II and III) in which bladder fundus mucosa or full thickness grafts were transplanted at the same time as trigone, there were 5 takes, all with bone formation. It appears that bone will form in association with trigone mucosa and full thickness trigone grafts, but in our experience the grafts survived less often than did those taken from the fundus. The reason for this is not apparent from our studies. It does not seem that the time at which the animals were killed can account for the difference, because bone was found in association with fundus mucosa as early as 10 weeks after grafting, while of the

TABLE III.

GROUP C—TRANSPLANTATION OF FULL THICKNESS TRIGONE INTO RIGHT RECTUS SHEATH AND TRANSPLANTATION OF FULL THICKNESS BLADDER WALL INTO LEFT RECTUS SHEATH

Dog No.	Duration of experiment	Gross appearance site of graft	Microscopic appearance graft
26	13 weeks	Gritty material—both sides	Right—no bone or cyst. Left—cyst and bone.
22	3 weeks	No sign of bone	Not done.
24	13 weeks	Right—gritty tissue Left—rubbery nodule	Right—no bone or cyst. Left—cyst and small amount of bone.

TABLE IV.

GROUP D—TRANSPLANTATION OF FULL THICKNESS TRIGONE INTO RECTUS SHEATH

Dog No.	Duration of experiment	Gross appearance site of graft	Microscopic appearance of graft
27	13 weeks	No bone, cyst or grit	Not examined
28	13 weeks	Small firm nodule	No bone
30	11 weeks	Small button of white tissue	No bone, good epithelium
32	15 weeks	Ovoid blue black cyst filled with jelly	Epithelial lined cyst with bone

#### OBSERVATIONS

In the present series of experiments the mucous membrane of the trigone or a full thickness graft from the trigone or fundus was transplanted into the rectus sheath in each of 33 dogs. Twenty animals survived and were killed at various times after operation, ranging from 8 to 26 weeks. The results are set out in Tables I, II, III, and IV.

#### DISCUSSION

It will be seen that in 13 dogs (Tables I and II) in which trigonal mucosa was transplanted, the graft took in only one and that in this case an epithelium-lined cyst with associated bone was present when the animal was killed. In 7 animals (Tables III and IV) in which full thickness trigone was transplanted, there were 2 takes with bone formation in 1. In 8 animals (Tables

13 animals with trigonal transplants 11 were killed at from 10 to 26 weeks after transplanting; once formed bone probably persists for a long time, if not throughout the animal's life. In any case our experiments do show that trigonal mucosa can cause bone to form (2 cases in 20), and therefore support our idea that bone formation is related to type of epithelium, being characteristic of the transitional variety.

This investigation was carried out with the aid of the National Research Council, whose assistance we acknowledge with thanks. All surgical work was done in the Department of Physiology, University of Manitoba. We wish to express our appreciation to Dr. V. H. K. Moorhouse, Professor of Physiology, and all members of his staff for their interest and co-operation. We also wish to thank Dr. Bruce Chown, Pathologist at the Children's Hospital, for doing the histological work, and Dr. John Cruise for his surgical assistance. The coloured photography was done by Mr. William Doern, x-ray department of the Winnipeg General Hospital, and microphotography by Miss L. Nason, Department of Pathology, Winnipeg General Hospital.

## APPENDIX

Since this work was completed we have observed, through the kindness of Dr. M. J. Ormrod, Department of Physiology, University of Manitoba, a remarkable specimen of spontaneous bone formation in the pelvis of a male dog. This specimen is illustrated in Figs. 1 and 2; Fig. 3 is an x-ray of the specimen. The bony formation took the form of a thin-walled cyst, about 10 cm. long and 4 cm. wide, traversed by several ramifying bony trabeculae. The bony cyst was situated in the right side of the pelvis, beside the bladder and extending down beside the prostate. A large blood clot lay between the cyst and the bladder. No connection between the cyst and any organ could be distinguished, not even with an accessory right ureter that happened to be present.

Fig. 4 is a photomicrograph of a section through the wall of the cyst at its fundus. It shows organized osteoid tissue with Haversian canals, interstitial systems and cancellous formation.

This specimen is recorded here as a remarkable instance of heterotopic bone formation, far exceeding our best experimental achievements. Though no relationship between this bony cyst and transitional epithelium can be demonstrated, it is to be noted (*a*) that it occurred near organs lined by transitional epithelium, and (*b*) that it occurred on the side where an accessory ureter bespeaks developmental irregularity involving transitional epithelium. It is an interesting and suggestive specimen.

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## HINDWORD

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A foreword being now impossible, Dr. Abbott has asked me to write a hindword to his series of papers on heterotopic osteogenesis, of which he tells me this may be the last. But there is little that I can add to work that speaks for itself. It is a neat contribution to the general problem of histogenesis. Modern research is revealing the complexity of the pattern of genetic and environmental factors that interact to produce a tissue: genetic factors that decide the possibilities, and environmental factors that determine which of the inherited possibilities shall be realized.

Presumably (though by no means certainly) genetic factors underlie the greater osteogenic capacity of transitional than of other epithelia, and of the dog's bladder than of that of the other animals investigated. Why the trigonal

mucosa should have so much less osteogenic power than that of the rest of the bladder is obscure. Trigonal transplantations presented greater technical difficulties than those from the rest of the bladder; only further work can settle whether the osteogenic deficiency is really inherent in trigonal mucosa or depends upon some technical factor. Granted inherent osteogenic capacity in certain transplanted epithelia, presumably the actual development of bone is determined by some factor or factors present in supra-liminal concentration in an environment of connective tissue of the abdominal wall, but in infra-liminal amounts in an environment of connective tissue of the liver, spleen, lung and bladder (Huggins). Of course, these local environmental factors may in turn be determined at least in part by genetic mechanisms.

It may turn out, however, that before we finally get our snarl of genetic and environmental factors untangled, some striking technical development (perhaps in another science, such as biochemistry) will quite re-orientate the problem, and lay these remarks on genetic and environmental factors upon the same dusty shelf as the mediæval dissertations on nominalism and realism, and the Lilliputian disputes between the Big-endians and the Little-endians. But one ventures to think that for some time to come students of heterotopic osteogenesis will do well to heed the observations recorded in these papers.

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## THIOURACIL\*

By Eldon M. Boyd, M.D. and  
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THIOURACIL has been recently made available to Canadian physicians and surgeons for the medical and preoperative surgical treatment of patients with thyrotoxicosis. When properly used, this drug often produces dramatic results, but it definitely should not be used *without a thorough and complete understanding of its pharmacology, therapeutics and toxicology*. The

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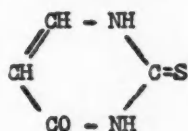
drug is not a time-saver nor an easy way out in the diagnosis and treatment of the various types of thyrotoxicosis. It should never be used if the physician or surgeon is not prepared to take the time and care needed to carefully assess the pharmacological action of the drug in each patient and be on guard against toxic effects, some of which are serious. In this article, we shall briefly review the available information upon thiouracil and describe our own experiences with it. The related drug, thiourea or thiocarbamide, which has been little used in this continent, will be briefly discussed.

### HISTORY

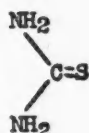
Amongst the many goiterogenic agents,<sup>1</sup> is rape seed oil and Kennedy of New Zealand reported in 1942<sup>2</sup> that he had found the goiterogenic substance in rape seed oil to be allylthiourea. At about the same time at Johns Hopkins University, the MacKenzies<sup>3</sup> were feeding rats sulfaguanidine in prolonged experiments to see if the drug would affect the production in the intestine of essential dietary factors, and when the rats came to autopsy they noted that the thyroid gland was in a goitrous condition; later they reported that thiourea was also goiterogenic.<sup>4</sup> The accidental discovery of the Hopkins group was followed by a report from Astwood of Harvard University<sup>5</sup> that thiouracil was the most effective goiterogenic agent of this group of substances in man.

### CHEMISTRY AND PREPARATIONS

Thiouracil is a white powder, slightly soluble in water, readily soluble in solutions of NaOH, insoluble in alcohol, stable with no odour and with a bitter taste.<sup>6</sup> Its structural relation to thiourea may be seen in the following formulæ:



THIOURACIL



THIOUREA

Astwood<sup>7</sup> investigated 106 compounds of this type and found goiterogenic activity only in certain thiourea derivatives and aniline derivatives.

Thiouracil is available for clinical use in tablet form. Initially, doses of 1 gm. and over per day were recommended<sup>8</sup> but more recently smaller doses have been advised because (a) they have been found as effective as the larger

doses and (b) in general they give rise to fewer toxic reactions. It is now our custom to begin with doses of not over 0.6 gm. per day, lower if the symptoms are not severe, and by the end of some two weeks when improvement is noted in the patient, we reduce the daily dose to 0.2 or even 0.1 gm. per day. It is possible that even smaller amounts might be effective as maintenance doses. The drug is available under at least two trade names, deracil (Lederle Laboratories) and thyracil (Frosst). We are indebted to the Lederle Laboratories for a supply of thiouracil which they placed at our disposal for experimental use.

### ABSORPTION, DISTRIBUTION AND ELIMINATION

Thiouracil was soon found to be readily absorbed from the gastro-intestinal tract and to quickly disappear from the body.<sup>8</sup> Williams and his group at Harvard<sup>9, 10</sup> have recently studied these factors in detail, both in animals and man. They conclude that some 15% of thiouracil is destroyed in the gastro-intestinal tract and the remaining 85% rapidly absorbed. After absorption of therapeutic doses, the *blood level* varies between 1 and 6 mgm. per 100 ml., most of the drug being in the red and white blood cells. Cerebrospinal fluid, oedema fluid and pericardial fluid contain little of the drug but pleural fluid and ascitic fluid contain about the same amount as whole blood. Thiouracil was then found *distributed* in all tissues of the body, with especially large amounts in the bone marrow, the thyroid, ovarian and pituitary glands and small amounts in the liver, striated muscle and testes. Regarding *elimination*, the above authors reported that with therapeutic doses, 15% was destroyed in the gut before absorption, 35% was eliminated in urine and the remaining 50% was destroyed in the tissues. No thiouracil was found in the stool but in pregnant females the drug was noted to pass through the placenta, and in lactating mothers it appeared in milk in fairly large amounts.

### MECHANISM OF ACTION

Thiouracil and thiourea produce a clinical and laboratory picture almost identical with that seen in hypothyroidism with, at the same time, hyperplasia of the thyroid gland.<sup>11</sup> This histological appearance of the thyroid may be taken to indicate a gland which is being stimulated but not producing sufficient thyroid hormone.<sup>12</sup> Experimental studies confirm this:

Himsworth<sup>11</sup> and the MacKenzies<sup>4</sup> found that hypophysectomy prevented thiourea hyperplasia of the thyroid, that administration of thyroxine neutralized the effect of thiourea but iodide therapy did not. The thyroid gland under the influence of thiourea contains smaller amounts of thyroxine and the output of iodide in the urine increases.<sup>13</sup> Administration of radioactive iodine results in a markedly decreased uptake of this tracer substance by the thyroid gland which is under the influence of thiouracil.<sup>16, 17, 18</sup> Most of the above studies upon thiourea have been confirmed using thiouracil.<sup>8, 15</sup> These facts may be fitted into the following pattern: thiouracil and thiourea prevent the thyroid gland from producing thyroid hormone from available iodine\* (indeed, an Aberdeen group suggests<sup>14</sup> that thiourea may actually combine with iodine and prevent its being utilized to form thyroid hormone), this in turn leads to an increased output of thyrotropic hormone which causes hyperplasia of the thyroid gland and eventually this may lead to a partial exhaustive atrophy of the thyroid, which could of itself result in a cure of thyrotoxicosis from thiouracil therapy alone.

#### SYSTEMIC EFFECTS OF THIOURACIL

(a) *The time factor.*—Our own clinical experience has been limited. Nine of our cases have been studied intensively for from five to fifteen months. All of these nine patients, and a number who have been watched for shorter periods, reported their first definite clinical improvement occurring in from 14 to 20 days after the institution of therapy with an average daily dose of 0.5 gm. of thiouracil. The daily dose was then dropped, as noted before, and the basal metabolic rate became normal in from 30 to 35 days from the onset of treatment. This has been in general the experience of others,<sup>6, 8, 19, 20, 21</sup> although at one clinic improvement in symptoms has been recorded within as few as two days from the commencement of therapy.<sup>40</sup>

How long the drug may or should be continued has not yet been determined. As described above, it is theoretically possible for the thyrotoxic process to subside during therapy with thiouracil. The length of time required for such a thiouracil "cure" and if a "cure" could

be effected would obviously depend upon each individual patient. We have no data, and we have seen no published data, upon this point.

On the other hand, we have information upon how soon signs and symptoms of thyrotoxicosis may recur when thiouracil therapy is stopped. We have substituted placebo sodium bicarbonate tablets for the thiouracil tablets and found that in about one month the symptoms started to reappear. In rats, it has been shown that two weeks after cessation of thiouracil, the thyroid gland is again capable of taking up normal amounts of radio-active iodine and of converting it to diiodotyrosine and thyroxine.<sup>18</sup>

(b) *Lugol's solution.*—The effect of previous, concurrent or subsequent iodine therapy in thiouracil-treated patients is at the moment somewhat obscure. Some claim that previous use of Lugol's solution delays the response to thiouracil, and they are in the majority;<sup>16, 19, 20, 22, 24</sup> while others say it has no effect.<sup>21</sup> In our series of cases, we are at present "on the fence", in that one of our patients previously given Lugol's solution responded promptly to thiouracil while another patient in the same category did not respond readily to thiouracil.

In our series of cases, we have found that concurrent use of Lugol's solution and thiouracil resulted in no improvement in the thyrotoxic state although a response was obtained later when Lugol's solution was stopped and thiouracil alone given. This seems to be the general consensus except that Lahey<sup>23</sup> of Boston advises the concurrent use of Lugol's solution and of thiouracil in the preoperative preparation of patients, feeling, as do other surgeons, that the thiouracil-prepared thyroid gland (untouched by Lugol's solution) is altogether too friable and readily bleeds and oozes blood at operation.

As a compromise, it would seem to be good practice, and one which we have used satisfactorily, to prepare a patient for thyroid surgery by giving first a course of thiouracil therapy, which may be ambulatory, and then when the thyrotoxic symptoms have subsided, a course of 7 to 10 days of Lugol's solution. By this time the patient is or should be free of all or most of the thyrotoxic symptoms, have an iodine-involuted, relatively avascular, non-friable thyroid gland and be a fit and proper subject for thyroid surgery.

\* The inhibition may result from interference with an enzymatic reaction;<sup>42, 43</sup> there is also recent evidence<sup>44</sup> that thiouracil and thiourea may neutralize thyroid hormone directly but the net clinical result would be the same in either case.



It is "confusin' but not amusin'" to find that while clinical observation has not agreed upon the status of concurrent use of Lugol's solution and thiouracil, experiments upon animals have demonstrated, as noted above, that concurrent iodine therapy does not affect the action of thiouracil or thiourea. The difference may lie, perhaps, in the fact that the experiments were carried out upon normal animals while clinical evidence is based upon results with thyrotoxic patients.

(c) *Signs and symptoms.*—The clinical response in all our patients who have tolerated thiouracil has been excellent; practically all authors agree that at least 90% of patients with

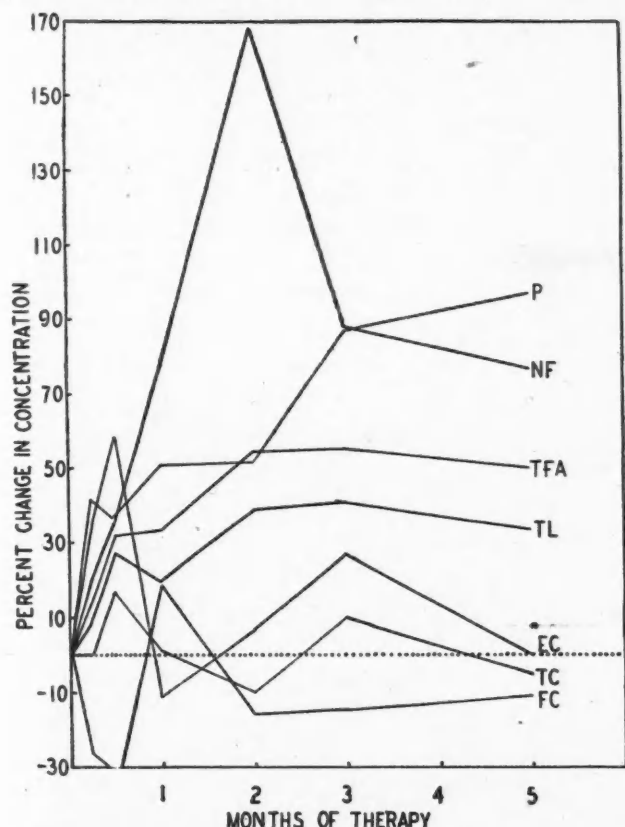


Fig. 1.—The mean percentage change in the concentration of plasma phospholipid (P), neutral fat (NF), total fatty acids (TFA), total lipid (TL), ester cholesterol (EC), total cholesterol (TC) and free cholesterol (FC) in nine patients with thyrotoxicosis treated with thiouracil.

thyrotoxicosis respond satisfactorily to the drug. The patient feels better, there is a gain in weight, a decrease in the basal metabolic rate, pulse rate and blood pressure. "Protein-bound iodine" in blood has been reported to decline toward normal values,<sup>6, 8, 19, 22</sup> but in our series of cases we were unable to detect any effect upon whole blood total iodine as measured by the technique used in this laboratory.<sup>25</sup> Detailed

metabolic studies at the New York Hospital<sup>26</sup> revealed an increase in the value of blood haemoglobin and in the white cell count, a fall in the urinary output of creatinine, creatine, calcium, phosphorus and nitrogen and a decline in the faecal output of calcium, phosphorus and nitrogen, all changes which normally follow thyroidectomy. Blood (total) cholesterol has been reported to increase in value by some<sup>22, 26</sup> while others have found little change.<sup>21, 24, 27</sup> Our own data upon plasma total, ester and free cholesterol indicate that the concentration of these is not appreciably affected by thiouracil therapy, (Fig. 1) and upon examining closely the figures of those who claim that blood cholesterol is affected, we find the reputed changes to be in general insignificant.

We present for the first time data upon the various other lipid fractions of plasma as estimated by oxidative micromethods<sup>28</sup> with the means charted in Fig. 1. In our patients, thiouracil therapy was followed by a marked rise in plasma neutral fat and phospholipid levels and a moderate increase in the concentration of plasma total fatty acids and total lipid; these various changes in plasma lipids are similar to but not identical with those seen following thyroidectomy where there is a general increase in the concentration of all plasma lipids. The administration of thyrotropic hormone has been reported to delay somewhat the action of thiouracil<sup>15</sup> and to decrease the uptake of thiouracil by the thyroid gland;<sup>31</sup> thiouracil has also been reported to abolish the effect of anterior hypophyseal growth hormone, to have no effect upon the action of gonadotropic hormones and to augment the activity of adrenotropic hormone.<sup>29</sup>

#### THE TOXICOLOGY OF THIOURACIL

A number of toxic reactions to thiouracil have been reported, mostly though not always where patients have been given large doses of the order of 1 gm. per day, and it is to be hoped that with the current use of smaller doses of the drug, fewer toxic reactions will be encountered. Indeed, some authors, using small doses, have reported no toxic effects.<sup>20, 22</sup> Toxic manifestations may be classified as:

(a) *Serious:* the most serious and dangerous complication is undoubtedly neutropenia<sup>8, 19, 29, 30, 34, 40</sup> which may be fatal.<sup>27, 32, 40</sup> It is the only reaction which has been reported to progress after withdrawal of the drug. In

our series we have been fortunate so far in seeing no neutropenia.

(b) *Fairly common*: various types of skin rashes<sup>19, 26, 29, 30</sup> and fever<sup>29</sup> may occur. We have seen two morbilliform rashes which subsided promptly with withdrawal of the drug and two patients with an obstinate prurigo of the legs. Two of our patients developed fever which developed rapidly and just as rapidly disappeared when the drug was discontinued; in one patient, the concurrent administration of 150 mgm. of vitamin C daily with thiouracil prevented the onset of fever.

(c) *Uncommon*: renal irritation,<sup>8</sup> mild jaundice,<sup>26</sup> headache,<sup>29</sup> allergic arthritis,<sup>19</sup> oedema of the legs,<sup>19</sup> nausea and vomiting,<sup>19, 21</sup> lymphadenopathy,<sup>30</sup> and accentuation of thyrotoxic symptoms<sup>35</sup> may all be noted as rather rare toxic reactions to thiouracil.\*

Thiourea seems to be as toxic as, if not more toxic than, thiouracil.<sup>33</sup>

#### INDICATIONS AND CONTRAINDICATIONS FOR THIOURACIL

It cannot be overemphasized that no one should use this drug at all who is not well versed in its pharmacology and possible dangers and who is not prepared to see his patients at frequent intervals during their treatment and undertake the careful laboratory and clinical examination necessary to assure that no dangerous reaction will get underway and possibly out of control.

(a) *Indications*: From our own observations and from the published reports of others, the present indications for thiouracil are:

1. The preoperative preparation of thyrotoxic patients for sub-total thyroidectomy. Thiouracil has a number of advantages over Lugol's solution alone for this purpose: preoperative treatment can be ambulatory, thyrotoxic symptoms

are brought under much more complete control than with Lugol's solution alone and both the pre- and post-operative course have been found smoother than with Lugol's solution alone.<sup>38, 39, 40</sup> The method of use has been discussed above.

2. Thiouracil is especially indicated in the treatment of thyrotoxic patients with such severe cardiac involvement that they are poor surgical risks.<sup>36, 37</sup> In these cases, the results may be so dramatic that a later decision to operate may be possible.

3. It is certainly the treatment of choice where extreme age or concurrent acute infection<sup>37</sup> makes operation impossible.

4. It offers a method of effective medical treatment where surgical treatment is refused. These patients should, of course, be acquainted with the possible risks of continued maintenance therapy, but they constitute a valuable and legitimate group for protracted clinical study.

5. Thiouracil may be very useful as a therapeutic test, especially if suitably controlled with periods of placebo medication, in the differential diagnosis of hyperthyroidism from anxiety states, etc.<sup>37</sup>

6. Thiouracil is the treatment *par excellence* for postoperative recurrences of thyrotoxicosis.

Further experience may reveal further indications for thiouracil. It is possible that if means can be found to overcome especially the more dangerous and severe toxic reactions to the drug, it may eventually replace thyroid surgery except in a few conditions as noted below.\*

(b) *Contraindications*.—(1) Patients with severe exophthalmos and mild thyrotoxic symptoms<sup>36</sup> may show augmentation of their ocular signs following administration of thiouracil. This is of course the group which also does badly following thyroidectomy and whose exophthalmos is sometimes benefited only by giving thyroid hormonal therapy. These cases give us the best clinical proof we have that exophthalmos is primarily an exhibition of excessive activity of thyrotropic hormone from the anterior hypophysis, whose function is normally countered by thyroid hormone.<sup>41</sup> This simple explanation does not apply to all cases of exophthalmos, however; indeed this symptom has been found occasionally to respond to thiouracil when operation has failed to remove it.<sup>40</sup>

\* Himsworth *et al.*<sup>45</sup> classify toxic reactions to thiouracil as (a) acute poisoning, which is hypothyroidism from an overdose, and (b) idiosyncrasy, which includes all of the reactions noted above. Donald and Dunlop<sup>46</sup> describe a patient who developed a large goitre and hypothyroidism from accidental, prolonged overdose of the drug, and Soskin and Levine<sup>47</sup> advise giving  $\frac{1}{2}$  to 1 grain of thyroid per day concurrently with thiouracil to prevent the development of a goitre and of exophthalmos. Bielschowsky<sup>48</sup> reported that the production of carcinoma of the thyroid was facilitated by administration of allylthiourea in rats and the *Journal of the American Medical Association* points out editorially<sup>49</sup> that this effect might apply to the use of thiouracil in man, especially when given to patients with adenomatous goitre or hyperplasia of the thyroid gland.

\* Nussey<sup>50</sup> of the Selly Oak Hospital at Birmingham, England, goes so far as to state that thiouracil is the method of choice in the treatment of all except a very few cases of thyrotoxicosis.



2. Patients with nodular goitres and hyperthyroidism are in some danger, not marked, of developing malignant change in the gland. Some have true hyperfunctioning adenomata of the thyroid and this group has always been considered proper for surgical intervention. While most patients in this group respond to thiouracil, it is advisable to use the drug only as a preoperative measure.

3. Poor tolerance to thiouracil constitutes undoubtedly the best contraindication.

4. Thiouracil will not reduce the size of a large goitre which, for æsthetic reasons or because it is producing pressure symptoms, should always be removed surgically.

5. This drug should not be given to patients who cannot be relied upon to follow explicitly directions given them or who live too far away to be adequately supervised by the physician.<sup>39</sup>

6. Conversely, thiouracil should not be used by any physician who is not in a position to take the time and care necessary to guard against toxic effects.<sup>36</sup>

7. In very mild cases of thyrotoxicosis, one must always balance the slight advantage to be gained by using thiouracil against the possibility of severe toxic reactions.

#### CONCLUSIONS

We must remember that thiouracil is a new drug which may or may not stand the test of time; that many patients have received benefit from its use over the period of some two years it has been available but we do not know what their condition will be in five, ten or more years from now; that thiouracil has toxic reactions which in a few instances have proved fatal (but there is a mortality rate from the operation of subtotal thyroidectomy as well). Man has always lived in a world of chances and risks, but today we may calculate those chances mathematically and then select the course most likely to succeed in any given circumstance if we have the data available.

What we need to know about thiouracil and thyrotoxicosis is: (a) The chances of the patient getting permanent relief and the chances of the patient dying from untreated thyrotoxicosis. (b) The chances of the patient getting permanent relief without toxic effects from the use of thiouracil. (c) The chances of the patient dying because of toxic reactions from thiouracil.

With these data on hand, and corresponding data for surgical treatment, we would be in a position to select the best course open to us and to point out the same to our patients. Indeed, the practice of medicine is based upon these concepts but in most instances we do not have the figures upon chance available and must make the best guess which our training, reading and personal experience will permit.

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## RÉSUMÉ

Le thiouracil ne doit être employé que par le médecin qui connaît bien la pharmacologie, le mécanisme d'action thérapeutique et la toxicologie de cette drogue. Le thiouracil a ses indications et ses contreindications; il peut présenter des complications sérieuses et des accidents plus bénins qu'il faut bien connaître. Il reste acquis que ce médicament constitue une excellente préparation à la thyroïdectomie, soit que l'on utilise ses seules propriétés, soit qu'on l'associe à la solution de Lugol, selon l'expérience individuelle des chirurgiens. Il faut connaître, en résumé, à propos du thiouracil et de la thyrotoxicose les chances que peut avoir un malade d'obtenir un soulagement définitif et les chances qu'il a de mourir d'une thyrotoxicose non traitée; les chances d'obtenir des résultats permanents sans effets toxiques; les possibilités d'une mort due à la toxicité du produit. Le thiouracil est un agent thérapeutique encore récent; il faut en faire un usage prudent et éclectique.

JEAN SAUCIER

### AGRANULOCYTIC ANGINA EFFECTIVELY TREATED WITH INTRAVENOUS PYRIDOXINE (VITAMIN B<sub>6</sub>)\*

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**A**GRANULOCYTIC angina or malignant neutropenia may be defined as a disease characterized by severe oral and pharyngeal sepsis, fever, profound prostration, a diminution or absence of the granular cells of the blood and a high mortality.

The disease was first described by Brown<sup>1</sup> in 1902. Schultz<sup>2</sup> twenty years later named the condition agranulocytosis and correlated the clinical and hæmatological findings. Earlier observers believed the disease to be a manifestation of overwhelming sepsis. However, the observation by Roberts and Kracke<sup>3</sup> that the blood changes preceded the signs in the throat led to the presently accepted belief that the lesions are due to the neutropenia which allows bacterial invasion. The neutropenia is believed to result from a disordered function of the myelocytic elements of the bone marrow.

What is the causative factor leading to the decreased production and maturation of granular cells by the bone marrow? In the cases described up to 1931, it was commonly held that there was a lack of a maturation factor comparable to pernicious anæmia. Our knowledge of the etiology of this disease was increased by

the observations of Kracke<sup>4</sup> that coal tar products could cause agranulocytosis. Madison and Squier<sup>5</sup> in 1934 pointed out the importance of amidopyrine as a cause of the disease. The list of offending drugs has been lengthened year by year and now includes a number of coal tar derivatives, the barbiturates and the sulfonamides. More recently, drugs which do not contain the benzene ring such as gold salts and thiouracil have been shown to produce agranulocytic angina.

Many of the cases regarded earlier as idiopathic due to a primary defect in the marrow were probably unrecognized examples of the secondary form of the disease. The three cases reported in this communication are of interest in that three chemically different types of the above noted drugs were ingested prior to the development of the typical clinical and hæmatological features of agranulocytic angina.

## CASE 1

A 58 year old white woman (Mrs. M.L.) was admitted to the University Hospital on February 2, 1944, complaining of a sore throat of three days' duration. On admission the temperature was 101.4° F. Examination of the throat showed acute inflammation involving the faucial pillars and tonsils. No evidence of ulceration was seen. She was given one gram of sulfathiazole at once by mouth, this dose being repeated at four-hour intervals. On the following day after she had been given four grams of sulfathiazole, her temperature had risen to 103.4° and the blood count showed 3,910,000 red cells, hæmoglobin 13.3 gm., 4,700 leucocytes with 6% polymorphonuclears, and 94% lymphocytes. The drug was discontinued immediately. Subjectively the patient's condition was much worse and areas of necrosis were evident in the throat.

On February 8, 10 c.c. intramuscular injections of pentose nucleotide were given intramuscularly every four hours. These injections were given for the succeeding three days and during this time she was given 1,500 c.c. of whole blood by transfusion. The condition in the throat became progressively worse and she continued to show an intermittent pyrexia with evening temperatures of 103 to 104° F.

The blood count on February 10 showed 4,060,000 red cells, hæmoglobin 13.7, 2,850 leucocytes, lymphocytes 100%.

The pentose nucleotide injections were then discontinued and she was given 200 mgm. of para-amino benzoic acid orally and 200 mgm. of pyridoxine intravenously daily. Within 48 hours the temperature became normal, she showed definite subjective improvement and the leucocyte count had increased to 3,950, with 9% granular cells. The temperature remained normal, and the throat condition continued to improve.

She was discharged from the hospital on February 28. The changes in the total leucocyte count and polymorphonuclear cells paralleled the clinical improvement as may be noted from the accompanying figure.

## CASE 2

The above noted patient was readmitted to the University Hospital on April 11, 1944. She had remained well since her previous discharge until two days before the present admission. She felt that she was catching cold and took 10 grains of acetyl salicylic acid. Shortly afterwards she developed an acute sore throat and fever.

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TABLE I.

Days after first dose of pyridoxine hydrochloride	Case 1		Case 2		Case 3	
	W.B.C.	P.M.N. %	W.B.C.	P.M.N. %	W.B.C.	P.M.N. %
0.....	2,850	0	6,400	0	4,250	6
1.....	3,950	9	.....	..	4,200	23
2.....	8,050	44	7,050	8	5,400	30
3.....	15,650	53	.....	..	6,500	37
4.....	19,150	67	10,900	27	8,400	53
6.....	23,750	43	21,300	61	7,750	68
8.....	28,500	59	29,300	61	7,800	75
10.....	27,900	64	18,000	78	9,100	66
12.....	17,400	62	15,850	80	.....	..
14.....	.....	..	11,950	74	.....	..
28.....	.....	..	14,600	63	.....	..

White blood count (W.B.C.) and % polymorphonuclear cells (P.M.N.) following the first dose of pyridoxine. The drug was discontinued between the fourth and sixth days.

On admission the oral temperature was 102.2° F., later rising to 104.2°. The throat showed marked oedema of the uvula and faucial pillars without any evidence of ulceration. The throat culture was negative for diphtheria and hemolytic streptococci. The admission blood count showed 5,240,000 red cells, haemoglobin 14.4 gm., 6,400 leucocytes, with 100% lymphocytes.

On April 13 she was given 200 mgm. pyridoxine intravenously. This was continued daily until April 21. The temperature reached normal on April 15 and except for a transient rise on the following day remained normal. The total leucocyte count on April 17 had increased to 10,900 with 22% polymorphonuclear cells. The further blood findings may be noted from the accompanying table. An interesting feature of the illness was that the total leucocyte count reached a level of 29,300 on April 28, one week after the pyridoxine injections had been discontinued. At this time the patient's temperature was normal, and the throat manifestations had completely disappeared. The patient, following her discharge on May 3, has remained well.

## CASE 3

A 55 year old white woman (Mrs. J.M.P.) was first seen on March 30, 1944, complaining of palpitation and nervousness of three months' duration. On examination she showed: weight 102 pounds, pulse 130, blood pressure 180/60. There was a tremor of the outstretched hands but no exophthalmos. The thyroid showed no evidence of enlargement. The basal metabolic rate was +58. A diagnosis of hyperthyroidism was made and surgical treatment was advised. The patient refused operation and was kept on a regimen of rest and phenobarbital for four months. No iodine was given. At the end of this period the basal metabolic rate was +45, weight 100 pounds, with slight subjective improvement.

Thiouracil medication was begun on August 15, 1944, but she only began taking the drug regularly on September 21, taking 0.6 gm. daily. Up to October 17 she had taken 13.5 gm. of thiouracil. Weekly blood counts gave normal findings until October 17 when the leucocyte count was found to be 4,300 with 86% lymphocytes, 6% polymorphonuclears

and 8% mononuclears. On the following day the patient developed an acute sore throat. When seen at her home on October 19, the mouth temperature was 103.2° F. The spleen was slightly enlarged. The throat was injected, with several small areas of exudate on the left pharyngeal wall and the left tonsil. She was admitted to the University Hospital on October 20.

During the first two days in hospital the temperature fluctuated from 100 to 102.6° F. The throat was red-dened and oedematous and showed two areas of ulceration on the left pharyngeal wall. The anterior cervical lymph nodes were enlarged and tender.

On admission a routine blood count showed 4,430,000 red cells, haemoglobin 12.3 gm., 4,250 leucocytes, with 5% polymorphonuclears and 95% lymphocytes.

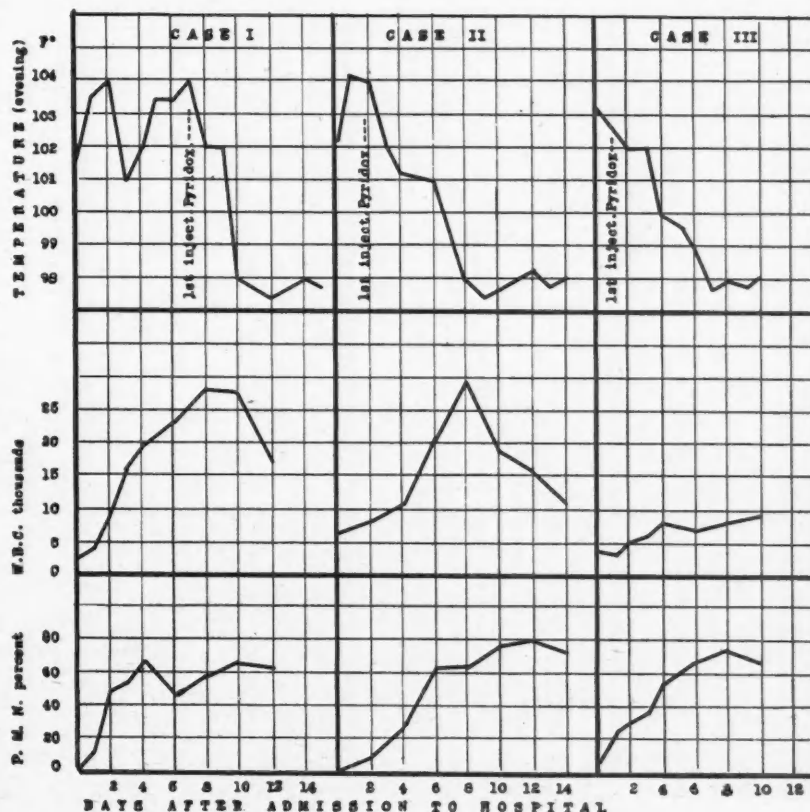


Fig. 1.—To illustrate the uniformity of the response to pyridoxine in the three cases described. The time of the initial treatment only is indicated.

A diagnosis of agranulocytic angina was made and intravenous medication with pyridoxine was given at once. During the first two days 125 mgm. were given daily. On the succeeding four days the daily intravenous dose was 200 mgm. Subjective and objective improvement in the throat condition was noticeable in 48 hours. Within 72 hours the patient's temperature became and remained normal.

It will be noted from the accompanying table that a rise of granular cells in the blood paralleled the fall in temperature. The patient was discharged from hospital feeling fit on the fourteenth day. She has remained well since and it may be of interest to note that even with the limited dosage of thiouracil over the two-month period her symptoms of thyrotoxicosis improved and her basal metabolic rate dropped to +12%.

The material used was a 10% solution of pyridoxine hydrochloride in physiological saline. This was put up in 10 c.c. rubber-capped vials and autoclaved for 30 minutes at 15 pounds pressure. The saline solution used was made up in triple glass-distilled pyrogen-free water.

#### DISCUSSION

Textbook treatment of agranulocytic angina is illustrative of the axiom "where knowledge is lacking, speculation is rife". A typical conclusion drawn after discussing many unrelated ideas is "... treatment has been of no avail in many instances. In the recovered patients treatment has been supportive and in no way specific". Blood transfusions, so commonly used in this disorder, are decried by Piney as useless and even dangerous. Pentose nucleotide has many advocates, but the dosage required, the long latent period before any improvement is noted, and its frequent ineffectiveness suggest that it is not a specific and that a remission might have occurred without its use.

Liver extract by the intravenous route is a more recent development. The clinical response to liver is difficult to assess because so often it has been combined with other measures. Experimentally, the reports are more promising. Thus Spicer *et al.*<sup>6</sup> have shown that leucopenia and agranulocytosis, which develop in rats fed sulfaguanidine in purified diets, can be prevented or cured by the administration of either liver or the norite eluate of liver. This observation has been confirmed by Axelrod and his associates.<sup>7</sup> Goldsmith and his co-workers<sup>8</sup> recently observed similar response to solubilized liver, which prevented the neutropenia produced by feeding thiourea to rats. It is thus clear that granulocytopenia in rats, which develops as a result of the administration of sulfonamides or thiourea, responds to liver or some liver extracts. Waisman and Elvehjem<sup>9</sup> suggest that "folic acid" is the active agent in this liver fraction,

Daft and Sebrell<sup>10</sup> provide experimental evidence for this view. In a critical review<sup>11</sup> of this development, it is pointed out that the effect of folic acid may be indirect, in that folic acid is required by the coliform bacteria in the intestine for the production of some accessory substance which in turn produces the granulocytopoietic response.

In a previous communication, we<sup>12</sup> presented the evidence which prompted our use of pyridoxine. Fouts *et al.*<sup>13</sup> observed that dogs with a dietary deficiency of pyridoxine develop a microcytic anæmia which is not relieved by iron. It is well known that the anæmia of pellagra and pernicious anæmia are similarly unresponsive to iron. Since pyridoxine is a constituent of liver and yeast, both of which are effective in these disorders, Vilter, Schiro and Spies<sup>14</sup> administered pyridoxine intravenously to three pellagrins and two patients with pernicious anæmia in relapse. Improvement was noted within 48 hours, and although there was only a 5% reticulocyte response, there was a striking increase in the leucocyte count, especially in the granulocytic series. Goldman and Malvados<sup>15</sup> report somewhat similar observations in bone marrow studies on three cases of Cooley's anæmia. These findings led us to attempt the treatment of agranulocytic angina with intravenously administered pyridoxine.

It may be argued that a spontaneous remission might have occurred in our cases. This is not unlikely in the second and third instances. In the first case however, the usual supportive measures were carried out for over a week. During this time the condition became progressively worse. The dramatic response within 48 hours following the administration of pyridoxine, in a dangerously ill patient, is inconsistent with the usual conception of spontaneous remission in this disorder.

The rapid and uniform response noted in our patients treated with pyridoxine hydrochloride intravenously leads us to propose that:

1. Pyridoxine is the factor in liver and liver extracts responsible for the granulocytopoietic effect noted when liver is administered in agranulocytic angina.

2. Pyridoxine produces granulocytopoiesis by an effect on the myelocytic elements of the bone marrow. It seems probable that pyridoxine is the factor involved in the maturation and emigration of the polymorphonuclear leucocyte.



### SUMMARY

1. Three cases of agranulocytic angina successfully treated with pyridoxine hydrochloride are reported.

2. Recent trends in therapy are reviewed and critically assessed on the basis of our findings.

3. It is postulated that pyridoxine is the maturation factor involved in the development of the polymorphonuclear leucocyte.

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## A CRITICAL SURVEY OF TWO DIAGNOSTIC PREGNANCY TESTS\*

(Colostrum Intracutaneous Test and  
Histidine Test)

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WITH the recruiting of thousands of married and single women into active military service, it was inevitable that some would be accepted for enlistment who were pregnant at the time they were first examined but in whom, at this time, the diagnosis would not be made. Routine physical examination would not likely reveal the pregnancy if it were under four months and particularly if the history of amenorrhœa were withheld.

Most of the women so enlisted are from one to three months pregnant at the time of report-

ing to the reception depot. The number involved is about five to eight per thousand personnel enlisted and is by no means large enough to warrant the expense of routine Aschheim-Zondek or Friedman tests on all women before enlistment.

In recent years, various simple diagnostic tests for pregnancy have been described in the literature. The colostrum test,<sup>1</sup> an intracutaneous test read within an hour of the injection, and the histidine test,<sup>4</sup> a chemical test carried out on a specimen of urine, with results also obtained within an hour, are two of these simple diagnostic tests.

It was thought by us that if the high degree of accuracy claimed for either of these tests could be duplicated in our hands, new recruits could be investigated readily for pregnancy and those giving positive results rejected, before time, money and effort had been expended in their training. These two tests were therefore investigated to determine their reliability in our hands, and hence their practicability for service use.

### COLOSTRUM TEST

This test was developed by Falls, Freda and Cohen of the Department of Obstetrics of the University of Illinois College of Medicine. It was reported by them in 1940.<sup>1</sup> They had used it for some four or more years and reported 94 to 96% accuracy on their findings.

The theoretical background of the test is stated to be the demonstrable sensitivity of a woman during the non-pregnant state and absence of sensitivity during the pregnant state to an antigen or antigens in colostrum obtained from primiparous women. Sensitivity is determined by the intracutaneous injection of colostrum prepared as outlined below. As stated in their paper<sup>1</sup> non-pregnant women show around the site of the injection a red reaction with swelling within fifteen minutes to an hour, whereas pregnant women show no reaction.

Falls and Freda state<sup>2</sup> that the test becomes positive about four to six weeks after conception and remains positive until close to term when it begins to lose its specificity. They have not, as yet, isolated the etiological material responsible for giving the test. However, the colostrum of multiparas does not apparently produce the same result. A previous pregnancy, although it may have lasted only two to three months, is evidently sufficient to render the colostrum in

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the next pregnancy unsuitable for testing purposes.

*Preparation of colostrum.*—Colostrum is expressed from the breasts of primiparous women at about the twenty-eighth week of pregnancy. Soap, water and ether are used for cleansing the nipple and areola and the material is collected in a sterile medicine glass. It is kept sterile thereafter throughout the preparation.

About four or five c.c. are obtained from any one person. Colostrum is obtained from several women, the material pooled and centrifuged. The epithelial tissue collects in the bottom, the fat globules collect on the surface and the middle layer, containing the active principle, is pipetted off. This is diluted with an equal amount of physiological saline and stored in a rubber-capped bottle at ordinary ice-box temperature. No antiseptic is added. In the original published report<sup>1</sup> it is stated that 1/10 c.c. of 1:100 merthiolate solution was added to every 10 c.c. However, the originators of the test felt that sensitivity to mercury might contribute to false negative (non-pregnancy) reactions and therefore discontinued its use.<sup>2</sup> Falls and Freda have set an arbitrary time limit for the potency of this material at four months.

*Technique of injection.*—The volar surface of the forearm is cleansed with ether and 1/50 c.c. of the colostrum solution injected intracutaneously. At first, Falls and Freda injected 1/50 c.c. of physiological saline as a control below the site of the colostrum test. This was later discontinued as it was found satisfactory to read the test without using the control. The test is read in thirty minutes and again at the end of one hour. These time limits have been set arbitrarily for comparative readings in the same individual.

*Interpretation of results.*—The criteria for interpreting the results were laid down by one of the originators of the test<sup>2</sup> as follows:

(a) Positive (pregnancy) reaction—absence of redness around the site of the injection at the end of one hour. A small pale wheal is usually present at the point of the needle prick.

(b) Negative (non-pregnancy) reaction—increase in size of the wheal and a surrounding area of redness at the end of one hour. The area of redness appears shortly after the test has been done and does not as a rule change in size over the hour period.

(c) Pseudo (weak pregnancy) reaction—a definite area of redness develops shortly after

the injection but disappears entirely or decreases markedly in size during the period of an hour.

The opinion was expressed that women in both very early and very late stages of pregnancy were likely to give a pseudo (weak pregnancy) reaction.

#### HISTIDINE TEST

This test was reported by Kapeller-Adler from the Institute of Animal Genetics and the Biochemical Laboratory of the Royal Infirmary, Edinburgh.<sup>4</sup> It is based on the statement that histidine has been found in easily demonstrable amounts in the urine of women who are pregnant, and is not normally found in easily demonstrable amounts apart from pregnancy.

*Materials used for the test.*—(a) Bromine reagent: 5 c.c. bromine and 500 c.c. glacial acetic acid diluted with 1,000 c.c. distilled water. (b) Ammonia solution containing 400 c.c. ammonia (specific gravity 0.880) and 200 c.c. 10% ammonium carbonate solution. (c) Potassium iodide starch paper. (d) N/10 potassium permanganate solution. (e) 10% sulphuric acid.

*Technique of the test.*—The urine is filtered if it is cloudy. If the filtrate is acid to litmus it is tested directly for histidine. If it is alkaline it is acidified in the following manner before testing for histidine:

To 5 c.c. urine 2 c.c. 10% sulphuric acid are added and sufficient N/10 potassium permanganate to provide a pink colour which will persist for half to one minute. The urine is allowed to stand for a few minutes until it becomes clear and almost colourless.

The test for histidine is carried out as follows on those urines which are already acid to start with and specimens which have been acidified:

To 5 c.c. of urine, the bromine reagent is added drop by drop. The resulting solution passes through a colour range deepening to brown or reddish brown. Then, as more bromine is added, the depth of colour decreases to attain finally a lemon yellow end point. The solution is allowed to stand for five to fifteen minutes or until the excess of bromine has disappeared as shown by testing with potassium iodide starch paper. One-half c.c. of the ammonia solution is then added and the resultant solution shaken. It is placed in a boiling water bath for three minutes. If histidine is present the solution becomes red-brown or red-violet in colour. If



histidine is not present the solution remains yellow or light brown in colour.

Kapeller-Adler claims almost 100% accuracy with this test in cases of normal pregnancy. In cases of non-pregnancy, 5% gave positive results. No figures are quoted on the incidence of false negative results.

#### PROCEDURE IN R.C.A.F. INVESTIGATION

(a) *Colostrum test*.—One of the authors (J.F.D.) visited the University of Illinois College of Medicine in order to discuss the colostrum test with the originators of it, to observe the preparation of the colostrum solution, to learn the technique of injection and the reading of the tests. All the material used subsequently in the experimental work carried on in the Royal Canadian Air Force was prepared in Chicago and tested and approved for potency before being sent to us.

In order to familiarize ourselves with the technique of injection and the reading of the tests, a series of 64 tests was carried out, using this approved material, on known pregnant and non-pregnant women at the Out-Patients' Department of the Women's College Hospital, Toronto. The results obtained are shown in Table I column 2.

The series on incoming recruits was then started. One of the authors (D.E.D) did all of the tests and read them at one-half and one hour intervals. Individual record cards were kept, showing the age, marital status, date of last menstrual period as stated by the subject, any abnormalities in menstrual history, and the date of the colostrum skin test with its result. The measurements in millimeters of the wheal and of the surrounding area of redness were recorded after one-half hour and one hour from the time of injection.

The criteria for interpretation described earlier in this article were followed. It was sometimes difficult, however, to differentiate between negative (non-pregnancy) and pseudo (weak pregnancy) reactions. A reaction with definite red pseudopodia, no matter how small in diameter, was considered negative. A reaction in which the degree of redness decreased markedly between the first and second readings was considered a pseudo (weak pregnancy) reaction. Reddish mottling of a small area was interpreted as a pseudo reaction.

Aschheim-Zondek or Friedman tests were carried out on all individuals showing a positive

(pregnancy) reaction or pseudo (weak pregnancy) reaction and excepting only those who were menstruating. Aschheim-Zondek tests were done in some cases and Friedman tests in others in accordance with the established custom of the laboratory to which the specimen of urine was sent. Hereafter in this article, A.Z. test will be used to mean Aschheim-Zondek or Friedman test.

All personnel with positive A.Z. tests were given a physical examination including a pelvic examination, and a repeat A.Z. test was carried out for further confirmation of the diagnosis.

The results of the colostrum tests in the Royal Canadian Air Force are recorded in Table I column 3.

(b) *Histidine test*.—Histidine tests were done on all women who gave positive (pregnancy) or pseudo (weak pregnancy) reactions to the colostrum test and who had subsequent A.Z. tests performed. Routine histidine tests were carried out on a further group of new recruits with the exception of those who were menstruating. Fresh morning specimens of urine were used for the test and subsequent A.Z. tests were carried out on all individuals who gave a positive or doubtful histidine reaction. All personnel with positive A.Z. tests were given a physical examination including a pelvic examination, and a repeat A.Z. test was carried out for further confirmation of the diagnosis.

All of the histidine tests were carried out by the same technician in order to minimize individual variation in technique and interpretation.

The results of the histidine tests are shown in Table II.

*A.Z. tests*.—Fresh morning specimens of urine were submitted for the A.Z. tests. Preservative was added in accordance with instructions received from the different laboratories where the tests were done. The specimens were sent to three Canadian University Laboratories and to one private laboratory.

*Criteria followed for the diagnosis of pregnancy*.—In making a diagnosis of pregnancy the following factors were taken into account and established as a general rule before a definite diagnosis was made: (a) history of intercourse; (b) history of amenorrhœa (usually); (c) breast changes; (d) pelvic examination showing some progressive enlargement of the uterus with softening and blue coloration of the cervix; (e) laboratory confirmation by a positive A.Z. report.

TABLE I.  
COLOSTRUM TEST RESULTS

	1		2		3	
Reaction to colostrum intracutaneous test	University of Illinois College of Medicine		Women's College Hospital, Toronto		R.C.A.F. (W.D.)	
	Number*	%	Number	%	Number	%
Known pregnant cases:						
Positive (pregnancy) reactions.....	260	98.1	24	63.2	1	14.3
Pseudo (weak pregnancy) reactions...	3	1.1	8	21.0	3	42.9
Total positive (pregnancy) reactions..	263	99.2	32	84.2	4	57.2
Negative reactions.....	2	0.8	6	15.8	3	42.8
	265	100.0	38	100.0	7	100.0
Known non-pregnant cases:						
Positive (pregnancy) reactions.....	7	2.2	0	0	58	10.8
Pseudo (weak pregnancy) reactions...	3	1.0	6	23.1	172	32.2
Total positive (pregnancy) reactions..	10	3.2	6	23.1	230	43.0
Negative reactions.....	303	96.8	20	76.9	305	57.0
	313	100.0	26	100.0	535	100.0
Total number tested.....	578		64		542	

\*Does not include a group of 45 children in whom positive reactions were obtained up to about ten years of age and negative results thereafter.

If the examining gynaecologist did not feel that the diagnosis was conclusively established, a repeat examination was carried out along with repeat laboratory tests in three or four weeks.

#### RESULTS

Colostrum skin tests were carried out on 542 women, in seven of whom a diagnosis of pregnancy was subsequently made in accordance with the criteria listed above.

Histidine tests were carried out on 1,024 women, in eight of whom a diagnosis of pregnancy was subsequently established.

Table I shows the results of the colostrum skin test as carried out in our hands at the Women's College Hospital, Toronto, and in the Royal Canadian Air Force. It also shows the results, comparatively represented, as obtained and published by Falls, Freda and Cohen and tabulated from their report. Our series of known pregnancy cases is extremely small. However, the prime purpose of this investigation was to detect pregnancy in apparently non-pregnant women and 43% of 535 such women gave pregnancy or weak pregnancy reactions. As shown by subsequent examination and testing, none of these women was pregnant.

Table II shows the results obtained using the histidine test. The number of cases of known pregnancy is again extremely small, however

six of the eight cases gave negative results. Of 1,016 known cases of non-pregnancy, 12.4% gave positive results. The remaining 87.6% showed correct non-pregnancy results.

TABLE II.  
HISTIDINE TEST RESULTS

	Known preg- nant cases		Known non- pregnant cases		Total
	No.	%	No.	%	
Positive (pregnancy).	1	12.5	34	3.3	35
Weak positive or doubtful.....	1	12.5	92	9.1	93
Total positive re- actions.....	2	25.0	126	12.4	128
Negative.....	6	75.0	890	87.6	896
Total.....	8	100.0	1,016	100.0	1,024

Table III summarizes the results of the A.Z. tests. There were 267 A.Z. tests carried out during the investigation. Of these, 247 or 92.6% were considered valid tests; that is, there were no false negative or false positive tests as evidenced by later findings. Of the remaining 20, 18 were false positive and two were false negative reports as shown by later physical findings and laboratory confirmation.

#### DISCUSSION

This investigation has been directed towards the search for a "screen" test which could be



TABLE III.  
ASCHEIM-ZONDEK OR FRIEDMAN TEST RESULTS

Laboratory	Preservative	Number of tests	Reports not confirmed by subsequent test and clinical findings	Percentage of correct reports
University A.....	5 drops phenol in 8 oz. specimen	53	1 false positive	98.1
University B.....	1 c.c. 95% grain alcohol to 9 c.c. specimen	75	1 false negative	98.7
University C.....	1 drop tricresol to 8 oz. specimen	74	5 false positives	93.2
Private laboratory D..	None	65	12 false positives 1 false negative	80.0
Total.....	.....	267	20	92.6

used simply and quickly on large groups of apparently normal non-pregnant women to detect early pregnancy which would be missed by the ordinary physical examination given applicants for enlistment.

The colostrum test in our hands showed little specificity in testing 542 non-selected women for pregnancy. Five hundred and thirty-five of these were non-pregnant but 230 of them or 43% gave either positive (pregnancy) or pseudo (weak pregnancy) reactions. In the Air Force series, the colostrum test was immediately followed by Schick and Dick tests, vaccination against small pox and a subcutaneous injection of 1 c.c. of T.A.B.T. immunizing agent (typhoid, paratyphoid A and B vaccine and tetanus toxoid). The initial reading of the colostrum test was made within ten or fifteen minutes of the completion of the above tests and it is not felt by the authors that it was influenced by them. The colostrum tests carried out at the Women's College Hospital were not associated with any other tests or immunization procedures. Although small in number they include a higher proportion of known cases of pregnancy. They likewise do not confirm the original published results.<sup>1</sup> Goldman, Kessler and Wilder<sup>3</sup> have published the results of colostrum intracutaneous tests carried out on 500 persons—185 known cases of pregnancy, 283 known cases of non-pregnancy and 32 children. They conclude that in their hands the colostrum intracutaneous test does not appear to offer a valuable diagnostic procedure for pregnancy. Our findings would seem to agree with this.

The histidine test in our hands gave less false positive reactions than did the colostrum test. However, in testing eight proved cases of pregnancy, six, or 75%, gave negative reactions. This makes the reliability of the test in our

hands very questionable and its use for our purposes impractical.

The large number of false positive A.Z. reports was rather disturbing. However, the majority of these reports were received from one laboratory and it is felt that this is a purely local factor and has no bearing on the reliability of the A.Z. test in experienced hands. In considering the explanation for false positive A.Z. tests, the possibility of an abortion occurring after the first positive report had been received, was not overlooked. One case in which the examining gynaecologist felt that this possibility existed has not been included as a false positive report.

Four of the cases of pregnancy were not diagnosed at the time of the investigation but were diagnosed some months later. Of these, one woman was probably about six weeks pregnant when the colostrum test was done. Her reaction was negative and no A.Z. test was done at that time nor was a histidine test carried out. The second woman was about eight weeks pregnant and had negative colostrum and negative histidine tests. The third and fourth cases were probably less than three weeks pregnant at the time they were tested and negative colostrum and negative histidine tests were obtained on both. The first two cases may be considered to have been "missed" by the diagnostic tests. It is unlikely that any pregnancy test would have given a positive reaction in the latter two cases. The remainder of the women listed as pregnant in this report were six weeks or more pregnant at the time the tests were carried out. In any case, they were sufficiently advanced that A.Z. tests were positive. The diagnosis of pregnancy was made on the basis of the previously listed criteria and the date of conception estimated at that time from history and physical examina-

tion. The date of conception can therefore only be approximate.

#### SUMMARY AND CONCLUSIONS

1. Diagnostic tests for pregnancy which may be carried out readily and read within an hour have been reported in the literature. A survey was made using two of these tests to determine their practicability in our hands as a "screen" test in detecting pregnancy among large numbers of apparently non-pregnant women.

2. Colostrum intracutaneous tests were carried out on 542 normal women between the ages of eighteen and forty. Histidine tests were done on specimens of urine from 1,024 normal women of the same age group. Both tests were carried out on 299 women in the former two groups. All positive reactors to either of these tests had subsequent A.Z. tests.

3. The colostrum intracutaneous test in our hands gave almost complete lack of specificity, 43% of the non-pregnant women tested having positive (pregnancy) or pseudo (weak pregnancy) reactions. The histidine test gave a much smaller number of false positive results. However false negative results were obtained.

4. Neither of these tests in our hands appears satisfactory for the purpose of detecting cases of pregnancy among large numbers of apparently non-pregnant women.

The co-operation received from the laboratories carrying out the A.Z. or Friedman tests is gratefully acknowledged.

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If penicillin makes good its promise, (and there are substantial "if's" yet to be evaluated), the cheapening, the safety, the facilitation in disease control, can directly expand, instead of shrinking, the volume of disease to be dealt with. The worker who lies back upon his oars at this juncture, believing the finished line crossed and the goal attained, may be venereal disease control's worst enemy by default.—Dr. John Stokes.

## RUPTURE OF THE UTERUS\*

(An Analysis of 53 Cases)

By E. Delfs, M.D. and N. J. Eastman, M.D.

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#### INCIDENCE

FROM January 1, 1900 to May 15, 1944, 53 cases of rupture of the uterus have been observed at the Johns Hopkins Hospital in the course of 53,574 viable deliveries,—a general incidence of once in every thousand deliveries. Many of these 53 cases, however, were referred to the hospital with the uterus already ruptured; some represented rupture of a Cæsarean section scar; some were traumatic ruptures and others spontaneous (Table I). The gross incidence cited, therefore, is of little import and

TABLE I.

Showing the total number of viable deliveries in the period under consideration and the distribution of the 53 ruptures of the uterus according to etiology.

Total viable deliveries, 1900-1943.....	53,574
Ruptures of Cæsarean section scar.....	10
Non-Cæsarean section ruptures.....	43
Total ruptures.....	53
Spontaneous.....	17
Traumatic.....	26

TABLE II.

Showing the incidence of the various types of rupture of the uterus in patients who were under our surveillance at the time of rupture. Incidence is calculated as ratio of ruptures to total viable deliveries.

	No.	Ratio
Ruptures in patients under our surveillance.....	34	1:1,576
Ruptures of Cæsarean section scar....	8	1:6,697
Non-Cæsarean section ruptures.....	26	1:2,060
Spontaneous.....	8	1:6,697
Traumatic.....	18	1:2,975

accordingly the series has been broken down, as shown in Table II, to indicate, on the basis of our experience, the frequency with which this accident, and its several types, may be expected in general obstetrical practice. Eliminating cases of rupture of a Cæsarean section scar and those in which the patient came under our surveillance with the uterus already ruptured, the incidence was one in 2,000 cases, approximately.

\* Read by Dr. Eastman at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Section of Obstetrics and Gynaecology, Toronto, Ontario, May 25, 1944.

From the Department of Obstetrics, the Johns Hopkins University and Hospital.



Traumatic rupture was more than twice as common as the spontaneous variety (in the non-Cæsarean series), the respective ratios being 1:2,975 and 1:6,694. Although it is customary to classify uterine ruptures as complete and incomplete (according to whether or not the peritoneum is torn), it is our opinion that this differentiation is of little clinical significance, since in modern practice the prognosis as well as the treatment is essentially the same in both types. In the present series of non-Cæsarean ruptures the vast majority (37 of the 43, or 86%) appeared to be complete.

Turning now to the frequency with which Cæsarean section scars rupture, we have had under our care 624 obstetrical patients who had had one or more previous abdominal deliveries, almost all by the classical technique. In half of these cases the pelvis was contracted (explaining the prior operation) and Cæsarean section was repeated because of the disproportion plus fear that the scar might rupture in labour. In 20% of the 624 cases the condition which dictated the prior operation was no longer present, yet abdominal delivery was repeated solely because of the threat presented by the scar. In the remaining 30%, vaginal delivery was al-

TABLE III.

Showing incidence of rupture of Cæsarean section scar in patients, under our surveillance, who had had one or more abdominal deliveries.

<i>Patients with previous Cæsarean section</i>		
	No.	%
Total deliveries.....	624	
Cæsarean section because disproportion plus scar.....	316	50.7
Cæsarean section—scar only indication..	120	19.2
Delivered vaginally.....	188	30.1
Total pregnancies.....	624	
Ruptures in pregnancy.....	6	1.0
Total labours.....	188	
Ruptures in labour.....	2	1.1

lowed. All these 624 patients, of course, faced the risk of rupture of the old scar during the present pregnancy, an accident which occurred six times or in 1%. Only 188, however, confronted the hazard of uterine rupture in labour since this possibility was eliminated in the remainder by elective Cæsarean section. Two of these uteri ruptured in the course of labour, again an incidence of 1% (Table III). All of the ruptured scars were of the classical type. Accordingly, in patients who have had previous classical Cæsarean sections and in whom there is no disproportion, the likelihood of rupture of

the old scar either in pregnancy or labour would seem to be in the neighbourhood of 2%.

RUPTURE OF CÆSAREAN SECTION SCAR

Since in modern obstetrical practice rupture of a Cæsarean section scar is the most common variety of this accident, our experience with ten examples of this complication will be considered first. The salient data concerning these cases are shown in Table IV. Particularly note-

TABLE IV-A.  
Analysis of 10 post-Cæsarean ruptures

<i>Past history</i>	
Previous Cæsarean section classical.....	10
Other.....	0
Previous Cæsarean section done by us.....	4
Done elsewhere.....	6
No intervening vaginal delivery.....	8
Intervening vaginal delivery (in one case 3).....	2
Previous puerperium afebrile, 3; febrile, 3; unknown, 4	
<i>Time of rupture</i>	
In pregnancy (at 35, 36, 37, 37, 38 and 39 weeks respectively).....	6
In labour.....	4

TABLE IV-B.  
Analysis of 10 post-Cæsarean ruptures.

<i>Signs and symptoms</i>	
Abdominal tenderness.....	10
Pain.....	9
Pallor.....	5
Cessation of labour.....	4 (100%)
Rise of head.....	4
Shock.....	3
External bleeding.....	1

TABLE IV-C.  
Analysis of 10 post-Cæsarean ruptures.

<i>Findings at operation</i>	
Blood in peritoneal cavity.....	7
Fetus extruded.....	6
Average weight of fetus.....	3,032
Placenta anterior.....	4
Placenta posterior.....	3
Placenta position not stated.....	3
Hysterectomy.....	9
Repair.....	1
<i>Outcome</i>	
Mothers died.....	2
Infants died.....	7

worthy and disappointing is the fact that our study of these cases has revealed no trustworthy criteria by which the integrity of a Cæsarean section scar can be determined. Thus, four of the previous operations had been performed by ourselves and six elsewhere; in three cases the puerperium after the Cæsarean section had been febrile and in an equal number afebrile, the temperature curves in the remaining four cases

being unknown. The significance of the time interval since the previous section is not clear. In five cases of rupture the interval was 1 to 1½ years, in the remainder it was 2, 3, 3, 4 and 7 years. Particularly disconcerting is the fact that one of these patients had delivered without incident three full term infants per vaginam since the abdominal delivery and yet in this, the fourth subsequent pregnancy, suffered rupture of the uterus *in pregnancy* with a 2,830 gram (6 lb. 4 oz.) infant. Another patient in this group had had one intervening vaginal delivery since the Cæsarean section. These cases illustrate the difficulty of forecasting just what the behaviour of a uterine scar will be in pregnancy and labour, as well as how treacherous a handicap it is to the childbearing woman.

As shown in Table IV-B, the only constant signs and symptoms of rupture of a Cæsarean section scar are pain and abdominal tenderness. Shock was present in less than half of our cases while vaginal bleeding was noted in only one of the ten ruptures. The frequent absence of shock in this variety of rupture is understandable when it is observed that in three cases (complete ruptures) no blood whatsoever was demonstrated in the peritoneal cavity (Table IV-C), the "scar" comprising only an avascular layer of endometrium and peritoneum. Although it might seem that an excessive size child would predispose to rupture of a scar, this was not true in the present series since the average weight of the infant was slightly below average, namely 3,032 grams (6 lb. 11 oz.). Nor was the location of the placenta a factor, since the number of cases in which it was situated on the anterior wall beneath the old scar was about the same as those in which it was implanted on the posterior wall.

The maternal mortality in rupture of a Cæsarean section scar is decidedly less than in the other types, the figure in the present series being 20%. The deaths were in cases which ruptured during pregnancy and both occurred postoperatively, one on the fourth day of bronchopneumonia and the other after a secondary operation for mechanical ileus on the sixth day. Only three of the ten babies, however, were saved.

#### SPONTANEOUS RUPTURE OF THE UTERUS (NON-CÆSAREAN)

The most outstanding finding in our 17 cases of spontaneous (non-Cæsarean) rupture of the

uterus was the transcendent rôle played by age and parity in the causation of this accident. As shown in Table V, the average age was 36.3 and the average parity 6.4. Six or more than one-third of the patients were 40 or over. Although primigravidae contributed 39.8% of the 53,574 deliveries occurring during the period under consideration, not a single primigravida suffered spontaneous rupture of the uterus, despite the circumstance that the soft parts in these patients offer much greater resistance to the uterine forces than with higher parity brackets. Beyond question, increasing parity and age bring with them certain changes in the uterine musculature which predispose to uterine disruption.

TABLE V-A.

Analysis of 17 spontaneous (non-Cæsarean) ruptures of the uterus.

	No.	%
Average age.....	36.3 years	
Average parity (all multiparæ) 6.4		
Rupture in labour.....	16	94.1
Rupture in pregnancy.....	1	5.9
Average duration of labour... 12.8 hours		
Pelvis contracted.....	7	41.2
Average weight of infant (8.2 lb.) 3,738 gm.		
Abnormal presentations (1 transverse, 1 brow)	2	11.8
Vaginal delivery after rupture.....	6	34.3
Diagnosis made post-mortem.....	4	23.6

TABLE V-B.

Analysis of 17 spontaneous (non-Cæsarean) ruptures of the uterus.

<i>Signs and symptoms</i>		
Bleeding.....	15	
Pain.....	13	
Abdominal tenderness.....	13	
Cessation of labour.....	10	
Shock.....	9	
Pallor.....	8	
Rise of head.....	6	
Syncope.....	6	
Blood in urine (positive in every case in which urine was examined).....	4	
Distension.....	2	

TABLE V-C.

Analysis of 17 spontaneous (non-Cæsarean) ruptures of the uterus.

<i>Findings at operation and outcome</i>		
	No.	%
Blood in peritoneal cavity.....	10	58.8
Extrusion of fetus.....	10	58.8
Broad ligament hæmatoma.....	4	23.5
Site of rupture:		
Lower segment only.....	12	70.6
Lower segment plus fundal.....	3	17.6
Fundal only.....	1	5.9
Unknown.....	1	5.9
Hysterectomy.....	11	64.7
Mothers died.....	10	58.8
Infants died.....	15	88.2



tion and, in our opinion, constitute the most important cause of spontaneous non-Cæsarean rupture.

The second outstanding cause of spontaneous rupture in the series was contraction of the pelvis, which was present in seven or 41.2% of the cases. Recalling, however, that all these seven women had previously given birth to one or more full term infants, it is obvious that some factor, in addition to pelvic contraction, must have been at work. Since the average weight of the baby in these seven cases was 3,945 gm. (8 lb. 11 oz.), fetal size doubtless played a contributory rôle; moreover, careful scrutiny of the individual records indicates that most of these multiparæ, with moderately contracted pelvis, had managed to deliver a series of small or average size infants, but suffered rupture when the strain of forcing a slightly larger baby through the pelvis was confronted. Let it be said again, however, that some weakness in the uterine musculature resulting from greater parity, was probably a more important determining cause of the rupture than disproportion, for the following reason. Among some 5,000 labours in primigravidæ with contracted pelvis which have come under our care, not a single spontaneous rupture has occurred. Many of these patients had prolonged tests of labour and in a large number the strongest pains were required to overcome the "tight fit" of the presenting part in the pelvis. In our experience, then, the primigravidous uterus is highly resistant to spontaneous rupture, while the multiparous organ is peculiarly vulnerable.

The fact that vaginal delivery was carried out after rupture in 6, or one-third of these cases (without realization that the accident had occurred), and that the diagnosis was only made postmortem in four of the same six, points to the difficulties which may be encountered in recognizing the condition. In 8 of the 17 cases, or almost one-half, there was no evidence of shock and in four neither pain nor abdominal tenderness (Table 5-B). In other words, the classical signs and symptoms are often lacking. As a diagnostic adjunct in cases of suspected rupture, we have found that the presence of gross blood in the urine is a helpful sign. It was observed in 4 of the present group and 6 of the traumatic series; this represents, respectively, 100% and 60% of the cases in which a notation was made about the condition of the

urine. It was not observed in any of the post-Cæsarean cases. Since most spontaneous and traumatic ruptures occur in the lower uterine segment, that is, in close proximity to the bladder, it is understandable that considerable strain might be imposed on the bladder wall in the course of these accidents and cause disruption of the mucosa with consequent bleeding.

As shown in Table V-C, 12, or 70% of the spontaneous ruptures occurred in the lower uterine segment and in three additional cases the tear appeared to start in the lower segment and then extended diagonally up the corpus. The lower segment ruptures began, without exception, in one or another side of the uterus. The maternal mortality was 58.8%, and the fetal mortality 88.2%.

One of the 17 spontaneous ruptures occurred in pregnancy without apparent provocation. This is one of the rarest accidents in obstetrics and in the cases heretofore studied by Basich, Riddell and others, has been ascribed to some inherent weakness of the uterine wall due either to disease processes or to operative trauma in a previous delivery, such as manual removal of the placenta. Our patient was a 34-year old, para V, whose uterus ruptured at term and there was nothing in the past or present history to explain the accident. The tear was located at the very top of the fundus, as is true of most of these spontaneous ruptures in pregnancy. Both mother and infant died.

#### TRAUMATIC RUPTURE OF THE UTERUS

By far the most common cause of traumatic rupture of the uterus is, of course, version and extraction and this operation accounted for 11 of our 26 cases, or 42.3% (Table VI-A). Two additional ruptures occurred in the course of Braxton Hicks version done for placenta prævia and if these cases be added to the 11 above, version may be incriminated in exactly one-half of our traumatic ruptures.

The signs and symptoms presented by these patients (Table VI-B) are similar to those met in the spontaneous group but the incidence of shock is somewhat higher. This is understandable since the rupture was associated with operative manipulations (including manual dilatation in seven of the early cases), blood loss incident to delivery, and anæsthesia in most of these cases. Distension occurred frequently, particularly when diagnosis was made late.

TABLE VI-A.

Analysis of 26 traumatic (non-Cæsarean) ruptures of the uterus.

Cases of traumatic rupture.....	26
Due to version and extraction.....	11
Version and extraction in the Clinic.....	10
Version and extraction before admission.....	1
Due to Braxton Hicks version (placenta prævia)....	2
Due to breech extraction.....	3
Due to Vorhees bag.....	1
Due to bougie.....	1
Due to attempted forceps.....	4
Due to pituitrin.....	4

TABLE VI-B.

Analysis of 26 traumatic (non-Cæsarean) ruptures of the uterus.

<i>Signs and symptoms</i>	
Abdominal tenderness.....	17
Shock.....	16
Pain.....	15
Bleeding.....	13
Distension.....	10
Pallor.....	8
Blood in urine.....	6
Syncope.....	4

TABLE VI-C.

Analysis of 26 traumatic (non-Cæsarean) ruptures of the uterus.

<i>Findings at operation and outcome</i>		
	No.	%
Blood in peritoneal cavity.....	15	57.7
Broad ligament hæmatoma.....	8	30.7
Site of rupture:		
Lower segment only.....	20	76.9
Lower segment plus fundal.....	5	19.2
Unknown.....	1	3.8
Lateral.....	21	80.7
Median.....	5	19.2
Hysterectomy.....	14	53.8
Mothers died.....	13	50.0
Infants died.....	21	80.7

The traumatic ruptures showed the same predilection as the spontaneous for the lower segment (see Table VI-C). In 20 cases, or 76.9%, the lower segment only was involved, in the rest there was also extension into the fundus. A great majority (80.7%) were lateral, the two sides being involved with equal frequency. The maternal mortality was 50% and the fetal mortality 80.7%, though not all of the latter could be charged to rupture of the uterus.

Since version and extraction has loomed so large as a causative factor in this and other series of traumatic uterine rupture, it has seemed desirable to consider what proportion of versions and extractions terminate in this accident. As shown in Table VII, among 827 versions and extractions performed in this clinic, there were 10 cases of rupture of the uterus, an incidence

of 1.2%. However, these 827 cases included 196 instances in which version and extraction was done on a second twin, and in these no rupture occurred. We have then 10 ruptures occurring in 631 versions and extractions in single pregnancies, a frequency of 1.6%. Since traumatic rupture carried with it a maternal mortality in the neighbourhood of 50%, it is obvious that version and extraction, with its 1:60 likelihood of causing rupture, is a formidable operation. Accordingly, it is gratifying to note (Table VII) that the operation is being used much less frequently than in former years. Indeed, if the period from 1900 to the present be divided into three approximately equal periods, it will be seen that in the first period it was employed five times more often and in the second period three times more often than in the last interval.

Spontaneous and traumatic ruptures are combined in Table VIII to demonstrate some difficulties in diagnosis which were encountered.

TABLE VII.

Showing incidence of uterine rupture due to version and extraction and diminishing employment of the operation.

Total versions and extractions.....	827
Done for second twin (no rupture).....	196
Done in single pregnancies.....	631
Ruptures due to version and extraction.....	10
Percentage of total versions and extractions	1.2
Percentage of versions and extractions in single pregnancies.....	1.6

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	1900- 1914	1915- 1929	1930- 1944
Deliveries.....	10,827	18,320	24,427
Total versions and ex- tractions.....	291	306	230
Percentage.....	2.7	1.7	0.9
Versions and extractions in single pregnancies only.	257	252	122
Percentage.....	2.4	1.4	0.5
Ratio.....	(1:42)	(1:71)	(1:200)

TABLE VIII.

Diagnosis in 43 cases of spontaneous and traumatic rupture of the uterus.

Diagnosis postmortem.....	9
Diagnosis late—no operation.....	8
Operation.....	26
Time between rupture and operation—average 8.3 hours.	
Some errors in diagnosis—rupture mistaken for:	
Premature separation of placenta.....	4 cases
Intestinal obstruction.....	4 cases
Cervical laceration (uterine rupture missed).....	4 cases
Placenta prævia.....	1 case
Deaths in 43 cases of spontaneous and traumatic rupture.....	23
Cause of death: Shock.....	13
Infection.....	10
Time of diagnosis in 23 fatal cases:	
Diagnosis postmortem.....	9
Diagnosis and operation after 4 hours.....	11
Diagnosis and operation before 4 hours.....	3

The association of cervical laceration and rupture of the uterus is of practical importance. In 16 of these 43 cases there was cervical laceration. The tear was continuous from the cervix into the uterus in 10, the other 6 cases had a segment of intact tissue between the two lacerations. In 4 of the latter, the cervical laceration was repaired but the uterine rupture was not recognized.

The average time (8.3 hours) between rupture and actual operation is not very significant since it is increased unduly by a few cases admitted 24 hours or more after rupture. However, the importance of promptness in diagnosis and treatment is shown by examination of the 23 fatal cases, of which only 3 were operated on within four hours of rupture. More than half of the deaths were due to shock, most of them occurring in early years before ready availability of transfusions.

#### GENERAL CONCLUSIONS

With increasing incidence of Cæsarean section, rupture of the scar has become the commonest cause of uterine rupture. A rational plan for the handling of patients with scarred uteri is, therefore, of importance. Obviously, when the indication for the first operation is still present or where there is the slightest possibility of mechanical dystocia, repeat Cæsarean section should be done. Unusual distension of the uterus as with hydramnios, multiple pregnancy, or excessive size of fetus should favour repeat Cæsarean section. In the remaining cases in which there are no adverse factors present, we have found no reliable criteria for predicting which scars will rupture or when. For the mother vaginal delivery seems to offer safety at least equal to Cæsarean section. The incidence of rupture in pregnancy and labour being 2% with 20% mortality, the maternal risk is 0.4%, as compared with an elective Cæsarean section mortality rate of 0.9% in this clinic. However, the fetal loss is very high when rupture occurs and, in addition, hope of future child-bearing is usually sacrificed. Thus in patients who have no living children or where a future pregnancy may be strongly desired, Cæsarean section may be preferable. When repeat Cæsarean section is decided upon, it should be carried out two or three weeks before the expected date of confinement as many ruptures occur in the last weeks of gestation.

The occurrence of spontaneous rupture of the uterus may be reduced by recognition of the hazard of multiparity and by alertness for even minor degrees of disproportion in this vulnerable group. Traumatic rupture is decreasing in incidence with the decline in version and extraction and other traumatizing manipulations.

The excessive maternal mortality from rupture of the uterus in the past should be vastly improved with earlier diagnosis, adequate support with transfusions and prompt operation.

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### ACUTE INVERSION OF THE UTERUS\*

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and

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ACUTE inversion of the uterus is of rare occurrence. Various writers differ as to incidence, the figure ranging from 1 in 50,000 to 1 in 190,000 deliveries. All, though, agree as to the rarity of the condition. In the course of the case reported a thorough canvass of the standard works on obstetrics and gynecology was made but very little on treatment of a detailed nature was found. Much that was found was contradictory. It is our aim here to present in detail an eye-witness account of one case, from onset to recovery, coincidentally interpolating and comparing the findings in the extant literature.

#### CASE HISTORY

The patient, a primipara aged 24, had progressed uneventfully month by month. Blood pressure and kidney function had remained normal, red cell count maintained itself at about 4,000,000, no abnormal weight increase was exhibited, her measurements were ample. Her home surroundings were hygienic.

*Course of labour—first stage.*—Labour commenced at 12.20 p.m. on April 29 with contractions at intervals of 20 minutes. Contractions increased in severity and frequency until 5.10 p.m. when examination was made. The cervix was dilated to admit three fingers, it was thinned out but non-resistant, the fetal head was engaged in the L.O.A. position. Nembutal gr. iii was exhibited. Pulse 92. Temperature 98.8°. At 10.20 p.m. the cervix was fully dilated, the head was distending the labia, contractions were strong at intervals of 2 to 3 minutes. At 10.35 p.m., as little advance was being made low forceps were applied and the second stage easily completed. The female infant was of good colour, well developed, cried lustily. The cord was well developed and of good length.

\* Report of a case from the records of the Fisher Memorial Hospital, Woodstock, N.B.



**Third stage.**—The uterus contracted well, the fundus could be felt firm and regular in outline about 2" below the umbilicus. As the patient had not fully reacted from the anæsthetic and as the placenta had not delivered into the vagina as evidenced by tension on the cord, the nurse in attendance was told to "hold" the fundus and the obstetrician proceeded to attend to the dressing of the cord. The nurse in attendance was the personal assistant of the obstetrician. She had assisted him in a long series of cases. By "holding" the fundus she knew that she was meant to place the four fingers of the right hand firmly over the dome of the fundus without undue pressure and without massage. This she did.

The obstetrician was interrupted in his dressing of the infant's cord by a cry of pain from the patient. Placing his hand on the fundus and finding that it was contracting he ordered the patient to bear down and put tension on the cord to lift the placenta from the vagina. The patient had one more pain and the placenta appeared. The obstetrician lifted the placenta to place it in the bowl and found to his horror that it was attached to the completely inverted uterus. Aghast at the tragedy he cudgelled his brain to think what to do but for many seconds could do nothing. The patient, however, unaware of anything out of the ordinary stated that "she felt just fine now that it was all over". Pulse 96; respirations 20, colour good, no perspiration. There was little or no hæmorrhage.

**Treatment.**—The placenta was allowed to remain attached for a few minutes, the obstetrician deciding that as its function gradually went into abeyance hæmorrhage on the eventual separation might be less. This proved to be true, the placenta fell away in a few minutes with little or no hæmorrhage. The patient still knew nothing of her condition. There was no faint sign or suggestion of shock. The obstetrician then made what he now believes to be a serious mistake. Under ether anæsthesia he attempted to replace the inverted uterus. With the first firm pressure of the hand on the presenting mass the effect was tragically dramatic. The patient, instantaneously, developed profound shock; the pulse became uncountable, the respiration shallow, the skin became beaded with perspiration, the mucous membranes and extremities became pale and cyanotic-like.

**Progress note.**—When shock occurred all attempts at replacement were immediately discontinued. Treatment for shock was commenced (respiratory and cardiac stimulants, intravenous, glucose-saline, external heat). After seven hours had elapsed, the patient, in fair condition, was moved by heated ambulance to hospital, a distance of 30 miles, where, on admission blood plasma was given, followed, within the hour by 400 c.c. of whole blood. The following morning blood transfusion was repeated and, at 3 p.m. of that day the patient was taken to the operating room where preparation had been made for (a) manual reposition and (b) if this failed, laparotomy and reposition by the Haultain technique. The temperature was 100° F.; pulse 90; respirations 22; blood pressure 96/50; Hgb. 56%; red cells 2,740,000, colour fair, no perspiration.

**Operative progress.**—With the patient anæsthetized the fundus was found to lie just within the introitus, its presenting endometrium deeply congested, the vagina containing small dark red blood clots. Through the abdominal wall a crater-like depression formed by the inverted fundus could be distinctly palpated. The operator, with the left hand steadying the crater through the abdominal wall and the fingers of the right hand in the vagina attempted the manœuvre described by so many writers of circumscribing compression and upward pressure, the so-called milking manœuvre. This, persisted with for three minutes produced no result. The patient's circulatory system did not resent the manipulation. The DeLee manœuvre, dilatation of the constricting cervix by the fingers with constant pressure upward by the palm of the same hand was attempted and failed. Both manœuvres failed also in the hands of the assistant and consultant. The patient's blood pressure and pulse did not vary through this 8 minutes of manipulation.

The assistant then conceived the successful manœuvre. It was simple. The operator, seated, placed the butt of the hand against the inverted fundus and with the arm straight from wrist to shoulder "leaned" against the fundus in the axis of the pelvis. After sixty seconds of this firm, constant pressure he reported the mass smaller. The operator replaced him and with a continuation of the same manœuvre felt the inverted fundus, gradually and slowly ascend through the cervix into the abdomen. The procedure required three minutes. The patient evidenced no shock. There was some slight hæmorrhage, the Hgb. dropping from 56 to 50%.

After an uneventful postoperative course, patient was discharged on the 12th postoperative day May 13 walking. Cervix well delineated, fundus below the symphysis, lochia normal. Her first menstrual period June 15 was profuse and lasted eight days. Her second, July 14, normal as to amount and lasted four days.

#### DISCUSSION

All writers are in agreement that acute inversion has its highest incidence among primiparæ. Some writers stress that the condition is commonest among those who have suffered one or the other of the toxæmias of pregnancy and amongst those who live in an unhygienic environment.

Atony of the uterine musculature with resulting feeble contractions is commonly included as part of the etiology. In this case the contractions were strong and well sustained. A short, poorly developed cord is given as another association. In this case the cord was of good length and well developed. So far then we find agreement with and among the writers upon only one point, *i.e.*, that the condition occurs with greatest frequency among primiparæ. The rarity of the condition, in our minds, accounts for the divergence of opinion.

All writers consulted agreed that acute puerperal inversion might be spontaneous or traumatic, *i.e.*, due to the clumsy handling of the third stage of labour. With the exception of DeLee and Berkeley all of the North American writers consulted seem to agree to the spontaneous type with their tongues in their cheeks, inferring that, for politeness' sake it should be mentioned but stressing the fact that manhandling of the fundus or tugging at the cord is in most cases the causative factor. DeLee and Berkeley are firmly of the opinion that spontaneous inversion is a clinical entity. Duncan and Reuch on the Continent uphold this. The mechanism is said to be a spontaneous contraction of a normal fundus with coincident relaxation of the lower uterine segment. It is this writer's opinion that the case reported is one of spontaneous inversion, neither fundus nor cord having been treated roughly. It is this writer's opinion that if the stigmata of carelessness was dissociated from the condition more

cases would be reported; that the incidence would be seen to be higher; that treatment would be more widely understood.

The obstetrician had carried in his mind for years the dictum that, if inversion of the uterus should occur immediate replacement should be attempted. On perusing the literature he found that this was an almost universal belief. DeLee dissented; he favours waiting until shock has been corrected, but, if hæmorrhage is a factor, he too favours attempt at immediate replacement. Zangemeister was the only other dissenter found; he believes that no attempt at replacement should be made until shock has subsided. In this case the patient showed no sign of shock. In this case pressure on the musculature of the fundus produced shock in an apparently well patient so quickly and so deeply that this writer is convinced that immediate reposition should never be attempted, that tamponade should be resorted to until the nerve endings with which the muscular coats of the uterus are so abundantly supplied are accustomed to their new environment. The sudden inversion of the uterus is one insult to the nerve supply, if this does not produce shock then it is our opinion that immediate attempt at replacement is a second insult which will.

After failure of two well known methods, the procedure described above served nicely in this case. It has to our knowledge never been described before. What seems to stand out in the operative report, though, is that, the fundus, after 36 hours of acclimatization to its new position can be handled with impunity in so far as shocking the patient is concerned. We have described above how quickly and how deeply shock was produced when immediate attempt at replacement was made. We would therefore suggest that attempt at immediate replacement of the uterus is never advisable.

#### SUMMARY

From observation of one case of this rare condition we believe:

1. That atraumatic spontaneous inversion of the uterus is a true clinical entity.
2. That immediate replacement of the inverted uterus is never advisable.
3. That a manœuvre for reposition described above is well worthy of consideration.
4. That this manœuvre is easier of execution and carries less threat to the thinned uterine

musculature than procedures previously published.

5. No bibliography is given. So many writers were consulted, so little of detailed description found, that, in this report, the majority opinion is given as the opinion currently held. The painstakingly detailed, completely inclusive article of DeLee in his textbook is the outstanding exception to this statement.

#### RÉSUMÉ

L'observation et le traitement d'un cas de la très rare complication obstétricale qu'est l'inversion utérine permet de recommander aux accoucheurs les précautions suivantes: il ne faut jamais réduire l'inversion immédiatement après sa production parce qu'une telle manœuvre est dangereuse à cause du shock inévitable; le tamponnement pendant 24 ou 36 heures habitue la muqueuse utérine aux pressions extérieures, permet d'éviter le shock et assure la réduction facile. La littérature sur le sujet est floue et contradictoire. Il semble que la procédure employée chez la malade observée soit celle qui doit faire loi. JEAN SAUCIER

### THE INTRAVENOUS USE OF NOVOCAINE AS A SUBSTITUTE FOR MORPHINE IN POSTOPERATIVE CARE\*

By Surg. Lieut. J. A. McLachlin,  
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THE idea of intravenous injection of local anæsthetic is not new. It was first advocated by Bier in 1909 who used it for the extremities only. He elevated the limb and applied an Esmarch bandage to express blood from the limb. A tourniquet was then applied to prevent re-entry of the blood into the limb and also the local anæsthetic from escaping into the general circulation. Local anæsthetic agent was then injected into the veins distal to the tourniquet.

In 1937 Lewy administered local anæsthetic intravenously in the treatment of tinnitus aurium. In 1940 at the Mayo Clinic it was used for pruritus associated with jaundice. Their method was either to inject 20 c.c. of a 0.1% solution of procaine hydrochloride over a period of 2 minutes which gave 2 to 4 hours of analgesia or 1 gram in a litre over several hours which gave a much longer period of analgesia. Finally in December 1943, Major R. A. Gordon, R.C.A.M.C., reported a series of 10 cases of burns which had been given surgical treatment under intravenous procaine hydrochloride. He

\*Presented at the annual combined meeting of the London Academy of Medicine and the Staff of Victoria Hospital, London.



found that 1 gram in 500 c.c. of normal saline run in over a period of 1 to 1½ hours was the most effective. He was able to do his preliminary treatment painlessly and have the patient comfortable for 10 to 12 hours post-operatively.

It was suggested that we might try this method as a substitute for morphine post-operatively, since it would possibly cut down the incidence of pulmonary and vascular complications, by having conscious cooperative patients who could help themselves in the matter of deep breathing and moving about in bed rather than be semi-conscious and inert under the effects of morphine. Also it would alleviate any postoperative vomiting due to the morphine itself.

Animal experimentation has shown that procaine is rapidly absorbed from the tissues into the blood stream where it is quickly hydrolyzed and detoxified by an enzyme which breaks it down into para-amino benzoic acid and diethylaminoethanol. The toxic symptoms decrease even though the blood concentration of these latter two substances rises. The products of detoxification then leave the blood stream rapidly until an equilibrium is reached between the blood and all the other tissues. These products are excreted by the kidney within 10 to 12 hours. Procaine possesses a marked affinity for nerve fibres without injuring other cells. It is also a convulsant and stimulant of the cerebral cortex.

The question of individual sensitivity was considered. Reaction to procaine is rare, but a skin test can be carried out. An intradermal wheal is made with 1 c.c. of a 1% solution. In sensitive people there is a marked local reaction, with systemic signs of dyspnoea and agitation. Lundy of the Mayo Clinic claims that the systemic reaction is the only real contraindication. The reaction occurs within 10 minutes. Ten tests carried out on the ward produced an area of redness corresponding to the size of the wheal; none showed a systemic reaction. All of these subjects had previously had local anaesthesia for minor lacerations and dental extractions without any untoward effects. The skin test is unnecessary if the patient gives a history of previous use of procaine without ill effects. In our cases we have made a further check by keeping the patient under personal observation for the first 10 minutes while the intravenous solution is running in slowly. In

that procaine is rapidly detoxified in the blood stream we considered that if any reaction did develop the solution could be discontinued immediately and the blood would rapidly hydrolyze the procaine already given. None of the cases reported by Major Gordon showed any reaction whatsoever. In our series two cases showed a rise in blood pressure of 15 points while the rest were unchanged.

Reactions are either of the central nervous system convulsant type indicated by agitation etc., which can be controlled by intravenous sodium luminal, or of respiratory circulatory embarrassment which can be treated by adrenalin hypodermically. A case of the latter type following intramuscular injection for myositis is reported in the *British Medical Journal*, February 13, 1943. This case showed almost complete recovery in 10 minutes following the injection of 2 minims of 1:1,000 adrenalin hydrochloride hypodermically.

We considered, since the novocaine tends to reach an equilibrium in all the body fluids, that our maximum point of action is in the area of the operative field since this has the greatest fluid supply due to the serum seepage and the increased vascularity of the reparative process.

Our series of cases consists of 10 major surgical patients; 5 extensive subtotal gastrectomies, 1 Finney pyloroplasty, 1 cholecystectomy, 2 hernial repairs and 1 lobectomy. The first two cases were given considerable morphine partly because of our own skepticism in the use of novocaine and partly because of not wanting to use the novocaine at night when the patients were in charge of student nurses only. However, they serve as an excellent example for comparison between morphine and novocaine therapy. The antagonistic effect of novocaine on sulfathiazole is recognized but none of our cases developed any infection in the wound. All of the cases showed no untoward effects and the last eight had almost pleasant postoperative courses.

#### CASE 1

Male, aged 60, extensive subtotal gastrectomy for ulcerative carcinoma. Patient given morphine grains 1/6 for pain 15 minutes after return from the operating room. One and three-quarter hours later patient again very restless and complaining of pain. Given 1 gram of novocaine crystals in 500 c.c. of normal saline over a period of one and one-quarter hours. In a few minutes he became quieter and comfortable. Remained so for 5 hours when on complaining of pain was given morphine grains 1/6. In the first 24 hours postoperatively he was given 3 more 1/6 grains of morphine making 5 in all. In the second 24 hours he received morphine grains 1/6 five times, in the third 4 times and in the fourth 3 times.



On the fifth day he was given codeine grains  $\frac{1}{2}$  twice. On the sixth, seventh and eighth days still complaining of some discomfort, but no sedative given. On the fourth day postoperatively the patient developed a cough which was treated with a sedative cough mixture for 6 days. Discharged on the fourteenth day without any complaints.

In surveying this case we see the novocaine gave the longest and most comfortable period during the early postoperative course.

#### CASE 2

Male, aged 43, extensive subtotal gastrectomy for gastric and stomal ulcers. Previous gastroenterostomy undone. Two hours after his return from the operating room and patient became very restless and complained of severe pain. He was given 1 gram of novocaine crystals in 500 c.c. normal saline intravenously over a period of 1 hour and ten minutes. Within 10 minutes of beginning he felt easier and was quite comfortable before the intravenous was completed. Three hours later he was still comfortable, but began to complain at the end of five hours. At this time he was given morphine gr.  $\frac{1}{6}$  and this was repeated twice at four hour intervals during the first night. Nurse's chart records a poor night for the patient. The first morning postoperatively he was once again given 1 gram of novocaine which gave him a comfortable period of 6 hours. In the second 24 hours he was given morphine grains  $\frac{1}{6}$  four times and chart records a poor night. His third 24 hours again shows morphine  $\frac{1}{6}$  four times. On his fourth day he was changed to codeine gr. ss P.R.N. He developed a cough on his fifth day and required a sedative cough mixture for 7 days. He was discharged on the fourteenth day.

Here again novocaine gave the longest intervals of freedom from pain. We were loath to repeat it before the 12 hours recommended, but have since considered that with the continuous intravenous being used postoperatively we were likely speeding up the excretion of the drug via the kidneys.

#### CASE 3

Female, aged 59. Finney pyloroplasty for stenosing peptic ulcer. Patient given morphine grains  $\frac{1}{6}$  for pain 45 minutes after return from the operating room. Seven hours later complaining of severe pain and very restless. One gram of novocaine in 500 c.c. normal saline administered intravenously over a period of one and one-quarter hours. Nine and one-half hours later (4.30 a.m.) given morphine gr.  $\frac{1}{6}$  for pain. Patient again complaining of pain in 5 hours so 1 gram of novocaine given. She now had a period of 12 hours in which she was comfortable and free from pain. A further gram of novocaine was given at this time, (36 hours postoperatively). Nothing further was given for pain and the remainder of her recovery was uneventful and comfortable. She was discharged the sixteenth day.

In this case the morphine was given once during the night because of hesitancy in giving the novocaine with only a student nurse in charge. The long periods of action of the drug in this case may be explained by the fact that the patient only weighed about 100 pounds so that we were in fact using a proportionately larger dose.

#### CASE 4

Male, aged 55, extensive subtotal gastrectomy for chronic gastritis with gastric ulcer. This patient returned from the operating room at 2.00 p.m. but did not regain consciousness till 6.00 p.m. At 7.00 p.m. he was given 1 gm. of novocaine intravenously in a period of 70 minutes. He was quite comfortable and had a good night. At 10.00 a.m. the next morning the novocaine was repeated. He was given nothing further for the pain for 42 hours (4.00 a.m.) when he required morphine grains  $\frac{1}{6}$ . The rest of his course was uneventful and the patient remarked on his freedom from pain during his postoperative recovery.

#### CASE 5

Male, aged 58, extensive subtotal gastrectomy for two peptic and one erosion ulcer all along the lesser curvature. Four hours postoperatively given 1 gm. of novocaine

for pain and restlessness. This was repeated in five hours. Patient had a fairly good night. Patient continued to be comfortable without further sedative till 63 hours postoperatively (3.00 a.m.) when he pulled out his Wangenstein tube during his sleep. He became uncomfortable and was given morphine grains  $\frac{1}{6}$ . He had no further pain and was discharged on the fourteenth day.

#### CASE 6

Male, aged 62, extensive subtotal gastrectomy for stenosing peptic ulcer. Five hours postoperatively became restless and complained of pain. One gram of novocaine given intravenously. Patient became quiet and comfortable and cooperated well with moving in bed and deep breathing. Eight hours later novocaine again given for restlessness and pain. Records show the patient then became comfortable and had a good night. No further sedatives were required for pain and the remainder of his postoperative course was comfortable. On the fifth day the patient was allowed up in a chair, on the sixth day had bathroom privileges and on the thirteenth day he was discharged.

#### CASE 7

Female, aged 50, cholecystectomy for chronic cholecystitis with cholelithiasis. Patient did not require sedative for pain until 20 hours postoperatively. At this time she began complaining of severe pain in area of incision. After half of the 1 gm. of novocaine solution was run in the patient said her pain was entirely gone. The novocaine was stopped and no further sedative was required during her recovery. She did not have any vomiting after completely coming out of her anæsthetic. A 70-year old woman had the identical condition and operation the same day. This patient was given morphine grains  $\frac{1}{6}$  3 times the first day, twice the second and once the third. She developed persistent vomiting the second day which only cleared up by putting down a Wangenstein tube and leaving it there for 72 hours. The patient given novocaine was by far the most comfortable.

#### CASE 8

Male, aged 56, bilateral inguinal herniotomy with fascial repair. Patient given 1 gram novocaine  $2\frac{1}{2}$  hours after return from the operating room. He slept fairly well the first night and was quite comfortable the following morning. The afternoon of the second day he was given one aspirin tablet. He required no further sedative during his postoperative course.

#### CASE 9

Male, aged 25, lobectomy for bronchiectasis. Patient returned from operating room almost conscious and soon was very restless and complaining of severe pain. Given 1 gm. novocaine and within  $\frac{1}{2}$  hour was quieter and comfortable. This was repeated 3 times in the first 24 hours at the gradually increasing intervals of 3, 5 and 9 hours. In the second 24 hours 1 gm. novocaine was given twice with a 9 hour interval. He required no further sedative during his postoperative course. His special nurses, all of whom had had previous experience with this type of case, stated that his postoperative course had been exceptionally easy.

#### CASE 10

Female, aged 38, repair of large lower abdominal ventral hernia. This patient was given 1 gm. novocaine the afternoon of her first day postoperatively. She required no further sedation and had an amazingly comfortable time. We consider this case to be an excellent one as the patient was one of the "old faithful" at the hospital and on her many previous appearances had been a constant complainer. She volunteered that she had not minded this operation in the least.

#### SUMMARY

1. Ten postoperative cases are described in which novocaine intravenously has been substituted for morphine. The results are extremely encouraging.

2. Novocaine can be given intravenously with safety.

3. Individual sensitivity is guarded against.

4. Novocaine intravenously has the advantage over morphine in that it allows conscious patients who can assist themselves in precautions against postoperative pulmonary and vascular complications.

5. The factor of the vomiting and malaise due to morphine therapy is eliminated.

6. The long-standing concern over accidental introduction of local anæsthetic into veins during tissue infiltration is apparently unfounded.

I wish to express my appreciation to Dr. A. J. Grace under whose guidance and on whose patients the above investigations were carried out. Also to Drs. G. A. Ramsay, Chief of Surgery, R. A. Waud, Professor of Pharmacology and J. A. Blezard, Acting Chief of Anæsthesia, all of the University of Western Ontario Medical School, for their interest and suggestions.

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### ANCILLARY SERVICES IN INDUSTRIAL HYGIENE\*

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COINCIDENT with the growth of medical services in industry there have developed other activities designed to conserve the health and vigour of work people. These ancillary services can be classified under two headings: Plant Safety, and Employee Welfare Plans. Probably the first received considerable impetus from the introduction of compensation legislation and the impact of these laws on the pocket book of the employer. While the initial interest

may have been somewhat narrow, the safety movement today takes a liberal view of its responsibilities. Within its own ranks it has developed specialists with a high degree of professional competence.

Welfare work for employees is a term used in a loose and not altogether satisfactory manner to describe some of the by-products of the laudable desire on the part of both labour and management for better working conditions and harmonious personnel relationships.

From the beginning the industrial physician must have had some awareness of what was being done in connection with plant safety, if only because he was called upon to treat the end results of unsafe practices. That in the past the interest of the plant physician has been somewhat detached from other industrial welfare activities is nobody's fault. Only within recent times have business administrators had an accumulation of experience of welfare plans sufficient to warrant evaluation. Out of this stock-taking has grown realization of the fact that the prevention and treatment of disabilities among employees and programs in industry for the development of the fuller enjoyment of life, have the same aim: the provision of the best possible conditions of employment. In the words of the president of one large commercial concern,<sup>1</sup>

"He rejected the narrower vision of industrial health. . . . He believed it should be based rather on a very wide philosophy, resting on the dictionary definition of health as physical, mental and moral soundness. Acceptance of this definition as applicable to industrial health must inevitably lead into a program embracing the production and development of the workers' good health at home, as well as in shop or office. It would also embrace nutrition; job security and freedom from personal worry to ensure serene mental health; and sound sympathetic industrial relations in the interest of moral health."

Coming from such a source and expressed with such clarity these views may well indicate the trend of the future. The extent to which businesses or perhaps groups of businesses will implement a fully rounded program will vary with conditions. But if the spirit and principle become a guiding force it is reasonable to expect that management in industry will favour a degree of integration of what today are somewhat scattered efforts on behalf of the well-being of employees. This does not necessarily imply centralization. Probably what will be asked for is a pooling of the skills possessed by leaders separately entrusted with various phases of a

\* For previous articles see *Canad. M. Ass. J.*, 51: 439, 521, 1944, and 52: 55, 136, 271, 1945.



common plan. To this community of interests the physician can make a major contribution. Whether the plant doctor is a member of a full time staff or whether he is part time, it can be helpful to him if, in addition to his professional knowledge, he has a general understanding of what is being done in industry in fields allied to his.

As already has been noted, safety work at first probably came under the notice of the industrial physician through the medium of the first-aid room. Roughly speaking, accident prevention has evolved through the following steps: provision of guards for machinery and workers, the elimination of process hazards, education of the workers as a basis for the prevention of unsafe practices. Extensive educational work is continually being carried on in industry through special classes for foremen and supervisors, meetings for employees, round-table discussions by representatives of management and shop committees. All recognized media of education are in use; talks by doctors and safety engineers, demonstrations, films, pamphlets, posters and bulletin notices. The material used is good and the physician will find it worthy of examination.<sup>2</sup> The interest of employees is kept alive through articles in house organs, through safety competitions for awards of various types, rewards for individual suggestions.

Safety educational work of a general nature naturally led to an understanding of the fact that special problems exist. Some of the more complex have to do with the recognition of psychophysical factors in accident-proneness, the safe utilization of the work capacity of the handicapped, protection against undue fatigue through such means as proper seating, lighting and ventilation, elimination of excessive noise and vibration, the use of the rest-pause. The newer knowledge of nutrition gives promise of contributing to means for further reducing accident rates, through the establishment of relationship between diet deficiencies, and fatigue, defects of vision and personality disorders.

Many large companies make use of physical requirement forms before assigning workers to jobs. In some cases these assignments, particularly in connection with handicapped persons or accident-repeaters, are subject to control by the plant medical department. Also, some firms follow the wise procedure of having the plant physician sit in on the examination of indi-

vidual accident reports. An accurate report on the circumstances surrounding each accident is essential as a basis for compiling statistical records. The "release to work" after recovery from disability is usually delegated to the plant physician. The form used provides space for advice as to the man's suitability for employment insofar as medical conditions may be involved.

Of late, industry has taken cognizance of off-the-job accidents in relation to work hours lost. Compilation of these data would appear to be a useful addition to the records of plant accidents.

To what extent the combined services of industrial safety and medical departments eventually might extend their accident prevention programs into the after-work hours of employees is a matter which probably will receive careful study.

Another activity of obvious interest to the physician is the provision of meals for employees during working hours. For discussion of the technical aspects of food in relation to human needs one must go to the ample source material which is available.

#### NUTRITION OF WORKERS

No wartime measure for the conservation of health has so caught the public imagination as has nutrition. All classes have been affected. Organized labour has shown marked interest.<sup>3</sup> Employers who have observed the results of industrial feeding in their own plants do not question the scientific findings relative to the effect of proper diet on muscular efficiency, work output, morale and reduced sickness and absenteeism. All signs point to the fact that one particular wartime lesson has been learned. Industrial cafeterias are here to stay and their number will increase.

In large feeding establishments the physician usually will find persons variously trained in the choice and preparation of suitable and properly balanced meals. But this is only half the story. There are management problems: and there is a human side to feeding people. If this last is ignored it can make ineffective the best-laid plans for giving people what we think is good for them.

There are four general operating policies in industrial cafeteria work,—(a) operation by a concessionaire; (b) by the employer; (c) by employees; (d) a combination of b and c. The



concessionnaire relieves the employer of responsibility of administration. But under certain circumstances this system can prove unsatisfactory unless those interested in the welfare of the employees have some control over the type and nutritional quality of the food served. Full operation by the employer enjoys the advantage of being part of management, therefore it is subject to managerial supervision. Operation by employees usually is an activity of a mutual benefit society, a recreational, or a social group. As a rule the firm co-operates by providing space rent free, as well as equipment and such things as light, gas, steam and hot water. Operation by employer and employees together has been successfully introduced by some firms. Committees elected by the employees from among themselves consult with management on problems in connection with the food service.<sup>4</sup>

There are three methods of serving food, with of course variations within each and the possibility of combinations: (a) regular dining-rooms with either table or self service; (b) lunch bars; (c) mobile units. The last differs radically from the other two inasmuch as through this medium food can be brought to the people instead of the other way around. The advantages are (a) trucks can be loaded off the premises, hence it is not necessary to assign valuable space to kitchens; (b) truck service can be expanded or contracted to changing needs more easily than the fixed form of lunch room.<sup>5</sup> The disadvantage is that the use of trucks tends to encourage hurried eating at the place of work. The employee loses those psychological benefits which accrue if he leaves his work place and enters a different environment for his lunch period.

The ideal dining room would be one so designed that it provides ample space per individual as well as light, ventilation and reasonable quiet. These desirable conditions are not always attainable even in new building projects because the room set apart for meals sometimes is intended for a dual purpose. As an example, sound-deadening material cannot be used if acoustic properties are to be preserved. Kitchen construction needs careful attention to details. A poorly laid out or cramped kitchen affects the quality of the cooking. The adequacy of the kitchen and its equipment should govern the number of people to whom one can serve proper food in proper comfort, not the number of chairs one can crowd into a dining room.

Existing industrial cafeterias disclose a variety of attitudes to the question of payment for food. Some serve at cost. Others sell considerably below cost. In one type of industry in particular it is a fairly common practice to make no charge at all. This last type of organization places few obstacles in the way of practical suggestions from welfare or personnel committees because the management believes in the basic soundness of feeding employees and is receptive to new ideas.

However well-intentioned the employer may be, the most exacting and withal the most interesting job in industrial feeding management is in connection with satisfying those who eat and those who serve them. Of the two groups the second deserves more sympathetic study than it usually gets. The preparation and serving of food is an ancient art with long established customs and jealously guarded traditions. A large kitchen staff in an industrial establishment presided over by a chef of the old school can become a close-knit world of its own, self-isolated from the organization which it is its duty to serve and of which it ought to be a recognized part. This leads to a "take it or leave it" attitude in connection with food preparation, minds hostile to innovation and a hypersensitiveness to imagined criticisms. Blame for this condition sometimes rests with personnel committees which are apt to forget smaller groups like the kitchen staff when planning for educational, recreational and other activities for the benefit of a large working force. The greatest single means of counteracting wrong attitudes on the part of the commissary department is to see that every member, from the humble dishwasher up, shares in every benefit and has the right to participate in every activity open to other employees. Certainly if there are employee associations of any kind the commissary staff should have its fair share of representation.

In planning the type and quantity of food to be served two sets of conditions have to be studied. Within the plant the governing factors are the nature of the work and the hours of work. But also there is the question of geography, home conditions and local or racial dietary habits. These matters affect what the worker eats in his off hours and to some extent direct his choice of food in the plant cafeteria unless he is subjected to education. It is well

to remember that dietary habits that look rather alarming on paper do not necessarily arise from a lack of intelligence. Food patterns were evolved long before we had a tested body of nutritional knowledge. A staple article of daily diet is seldom injurious *per se*. What industrial feeding can do is to supplement the ordinary diet of workers and thus to some extent correct known deficiencies.

Education can be of two kinds. There is the subtle type which consists of prominently displaying essential food items in forms that attract the eye and the appetite.\* There is the direct teaching method. The latter includes talks on food values and demonstration of food preparation by competent persons.

There are available free of cost many very excellent pamphlets dealing with normal nutrition. These can be obtained from Government departments, welfare agencies and reputable commercial concerns. Pamphlets differ in their method of approach. Some merely list the protective foods that should be eaten. Others break down recommended dietary items in terms of calories, carbohydrates, fats, proteins, minerals and vitamins. A third and more elaborate type of literature embodies the foregoing information and also explains how various nutrients affect bodily functions. There is a wide selection of literature to choose from. Those in charge of the program of instruction will know best what is most suitable for particular groups of employees.

In arranging for nutrition education one will keep in mind that the terms "workers" or "employees" have a broad connotation. Industry employs persons of both sexes, varying ages and different social levels, engaged in a wide range of occupations. All these people can be, and often are, interested in the same subject but their interest will stem from different sources. With the younger age groups proper nutrition can be stressed in relation to those things which add up to attractiveness, as well as general health. Older people are not likely to be so interested in their appearance. They are more likely to be interested in food habits in relation to eyesight, bodily fatigue, working ability and a sense of well-being.

Demonstrations in buying, preparing and cooking food are of perennial interest to women. It is not clear why custom has excluded men from this type of education. Many men like to cook. An even greater number take what might be called an academic interest in the subject. Perhaps industry could further the cause of better nutrition in working class families by giving courses for men. The knowledge so gained might favourably affect kitchen practices in some homes.

\* It is the experience of the writer that even so slight a change as substituting glasses for heavy mugs will bring about an increase in consumption of both milk and citrus or tomato juice. Salad consumption will increase an hundred fold if the salad mixture in bulk is placed on the tables in large wooden salad bowls from which the people can help themselves. There seems to be a homey touch about this method.

Directors of plant safety and managers of industrial cafeterias are justified in considering their work as specialties. However both activities are directed to a common end, and in education they both use channels of communication made possible through the existence of organizations others than their own. These are ready-made audiences provided by groups of employees banded together for mutual benefit or for recreation.

In their original form mutual benefit societies chiefly were concerned with administering funds that could be drawn upon by needy members. As early benefit plans often covered disability, as well as old age and death, some sort of medical advisory service was always necessary. While group insurance has modified the functions of mutual benefit associations they continue to operate usefully in industry. How important a place the physician occupies in the multiple activities of these societies in their modern form is indicated in a recent study entitled *The Relation of the Industrial Physician to the Employee Benefit Association*.<sup>6</sup> It was stated that of the companies with benefit plans less than 4% reported that the medical department had no part in the administration of the plan. Some concerns expressed the opinion that the success of the plan depended to a considerable extent upon the co-operation of the medical department. In many cases the plant physician was a director of the association. One large company in reporting on its employees' benefit society stated that the medical staff educated the members in good health habits, thus reducing the incidence and duration of sickness. The company considered this health promotion activity of the medical department so important that it had financed research in various phases of disability. In this particular case it is evident that health education, under direction of physicians connected with the firm, constituted a major activity of a voluntary association of employees. The program must have been acceptable to a very large proportion of the membership. It would seem that these good people were eager to use their plant medical department as something more than merely a repair shop for industrial casualties. In the report already quoted<sup>7</sup> favourable opinion about the value of medical participation applies equally to associations supported entirely by membership fees and those to which the employer contributes part of the cost.



Athletic clubs, as well as associations which take in a wider range of recreation, sometimes are off-shoots of mutual benefit societies. Frequently they are governed by separate committees under the leadership of sports directors.

In 1940 the National Association of Manufacturers of the United States, under the direction of Dr. Victor G. Heiser, made a survey of health practices in 2,064 industrial establishments. It was found that 52% included recreation in company-sponsored programs. These varied all the way from elaborate plants owned by an industry and equipped with club rooms, in-door pools, gymnasias, out-door playing space, libraries and meeting halls; to more modest enterprises which to some extent made use of community facilities.

A booklet *The Industrial Department of Health*<sup>8</sup> states: "because of the monotony in operations of modern industrial practice, many industries have found it worth while to stimulate and subsidize organized recreation. All of these efforts have a definite health aspect. Interest and active participation by members of the medical department will result in many benefits to both the medical department and those they serve."

The above is typical of pronouncements with which one is not disposed to quarrel. However, when one seeks for guidance as to in what way co-operation can be mutually beneficial it is irritating to be confronted only with clichés. *Of course* the plant doctor can examine employees before they take part in strenuous sports, give medical care to injuries sustained on company operated playing fields and be given the oversight of sanitation of recreational facilities including swimming pools. These are elementary duties tied to the narrow view that recreation always means athletics. There is a broader and more satisfying interpretation. It is encouraging to note evidence of the unqualified acceptance of this in the Dominion National Physical Fitness Act.

Without dipping very deeply into the well-springs of human motives, industry seems to have arrived at a common sense appreciation of man's desire for interests and modes of self-expression not usually satisfied through the energy that he expends in gainful employment. From this understanding has sprung stimulation and financing of company recreational programs that include educational and cultural activities, art and music classes and hobbies. This is

psychologically sound. Also, industry is on solid ground in fostering such movements within itself instead of expecting employees to find all their recreational interests outside. Man is inherently gregarious and other things being equal likes to ally himself with those with whom he has established contacts.

One would like to have proof of the claim that Canadians as a people do not engage in enough physical exercise. Probably we would benefit more if we could better distribute our hours of play; but this is conditioned by our hours of work. In any event gymnastics or exhausting hikes under command of a well meaning extrovert who has not out-grown the Big Injun stage of development, are not cures for all minds and spirits needing refreshment.

Because of man's inventions his work may be drudgery except in the favoured callings. We need some part of our leisure in which we can release the dammed-up overflow of creative energy. There is nothing illogical in a man who works in a machine-equipped factory, spending his spare time in the use of tools, because what he makes with his own hands is an extension of himself. Manual arts, study, dramatics, collecting, hobbies of various kinds, even if devoid of any element of physical exercise, all have value. They broaden outlook and satisfy desire for achievement. Nor is occasional escape into the realm of imagination to be despised as a corrective to some of the less desirable features of the machine age.

The future of the length of the working day is not clear. Hours may grow shorter as our bright young prophets predict or we may all have to work harder. Industry may have to retire its employees earlier; or if an increase in the span of life is accompanied by preservation of vigour, society may be faced with the necessity of finding work to keep its old hands out of mischief. One thing seems certain: the proper use of leisure is a practical problem.

Perhaps it will be the medical clinic of the industrial hygiene department that will provide the greatest opportunity for the physician to guide employees into offtime activities for the sake of their complete well-being. In modern industry the employee does not see the doctor only in times of sickness. The pre-employment examination, periodic check-up and interviews for special purposes bring the two together at not infrequent intervals. If in talking recreation in all its varied usefulness the physician

finds himself practising mental hygiene he need not be troubled: employers will rise up and call him blessed.

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## CURARE: A NEW TOOL FOR THE ANÆSTHETIST\*

By Harold R. Griffith, M.D.

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THE introduction of curare into clinical medicine has provided the anæsthetist with a most useful new tool. To be able to produce complete muscular relaxation quickly and safely at any time during the course of an operation is a goal of which every anæsthetist and surgeon has dreamed. Rigid abdominal muscles are the cause of more profanity by the surgeons and sweat and tears by the anæsthetists than any other occurrence in the operating room. Curare, the old familiar plaything of the physiological laboratory, will give us this desired relaxation, and after more than two years of clinical experimentation, those of us who have been using it in the operating room have concluded that it is quite safe when administered under properly controlled conditions.

The story of the transformation of this South American Indian arrow poison into an anæsthetist's tool may be told briefly as follows: Curare has been known to science since 1595 when Hakluyt referred to it in his description of Sir Walter Raleigh's voyage up the Orinoco. In 1840 Claude Bernard<sup>1</sup> in a series of famous physiological experiments, confirmed the observations which Watterton and Brodie had made in 1814, that the action of curare was paralysis due to interruption of neuro-muscular mechan-

ism. The drug therefore became of value in the physiological laboratory for the study of muscle activity without interference from nervous impulses. Clinicians had more than once cast hopeful eyes toward the possible use of curare in the treatment of spastic disease of the muscles but always its poisonous reputation and the presence of cardiac depressants and other adulterants in the available supplies made a clinical trial seem too dangerous.

No one knew the exact botanical sources of curare or the chemical composition of its active principle. In 1938 Richard C. Gill,<sup>2</sup> an American who had lived for years in the upper Amazonian jungles of Ecuador and who was familiar with the Indian folklore and mysticism which has surrounded the "flying death", as curare is called in the jungle, brought back to the United States the first adequate supply of the drug with properly labelled specimens of the various plants which are used by the Indians in the manufacture of crude curare. Professor A. R. McIntyre<sup>3</sup> of the University of Nebraska then subjected this supply of curare to the first pharmacological study by modern methods. Through co-operation with the Research Laboratories of E. R. Squibb & Sons a purified product was produced which exhibited the true curare action without toxic side effects and which seemed safe for human experimentation. The present commercial product, which is known as intocostin (extract of purified curare, Squibb), is marketed in 5 c.c. vials of a pale amber liquid which contains 20 mgm. of active curare substance to each c.c. It is obtained from the single plant *Chondrodendron tomentosum* and has a selective action affecting first the muscles of the throat and neck, then skeletal muscles of the extremities, chest and abdomen, and the diaphragm last or not at all. It has no effect on involuntary or cardiac muscle in therapeutic doses.

The first large scale test of the new curare on human subjects was made by Professor A. E. Bennett<sup>4</sup> of the University of Nebraska who used it to soften the traumatic effects of convulsive shock therapy in psychiatric patients. This use for curare in conjunction with both metrazol and electric shock therapy has become widespread in mental hospitals, and now many thousand injections have been given without harmful effect. With this pharmacological and clinical evidence of the safety of intocostin we felt that it might

\* Read at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Section of Anæsthesia, Toronto, Ontario, May 24, 1944.



be tried on patients under general anaesthesia, and so at the suggestion of Dr. L. H. Wright we began using it in the operating room of the Homœopathic Hospital of Montreal in January, 1942. We were immediately pleased with the results obtained and the absence of any harmful effect either during or after operation. Dr. Enid Johnson and I published a preliminary report<sup>5</sup> of our first 25 cases and we continued to use the drug cautiously in selected cases, becoming increasingly confident that we had hit upon something to make the anaesthetist's dream regarding relaxation come true.<sup>6</sup> Up to the present we have used curare in only 300 cases, because our preference has been to use it only when extra relaxation was required. Dr. S. C. Cullen<sup>7, 8</sup> of the University of Iowa, who also began to use it in anaesthesia in 1942, has provided us with an impressive demonstration of the safety of curare in a much larger series of cases, since he began to give it routinely in every abdominal operation, and has now reported over 1,000 administrations. Reports from other anaesthetists tell of equal success without any harmful effect. The evidence thus accumulated has led me to the conclusion that curare can be used with impunity in any case where muscular relaxation is required, provided facilities are always available for controlling respiration during the period of its action.

Curare acts on the neuro-muscular synapse probably by neutralization of the acetylcholine reaction. It effectively blocks synaptic transmission between preganglionic and postganglionic fibres of the sympathetic division of the autonomic nervous system. Its action does not extend to structures innervated by postganglionic fibres, such as glands and smooth muscle. There does seem to be, however, a contraction of the bowel itself, probably because of complete relaxation of the abdominal wall and quiet respiration. Curare is eliminated very rapidly, partly by destruction in the liver and partly by excretion unchanged by the kidneys. No evidence of any visceral damage has been produced and no direct effect on the heart reported. It may apparently be given to patients with damaged liver or kidney without any prolongation or intensification of the effect. We have used it on some very poor risk patients quite harmlessly, although the cases where it is most needed for relaxation are healthy muscular individuals. Respiratory depression may occur following curare injection, and has been noted in about

10% of our cases. However, this is always transitory and may easily be controlled by the same methods which we employ to control respiratory depression occurring from other causes during anaesthesia. An overdose causing complete respiratory paralysis can be overcome by artificial ventilation of the lungs with oxygen during the ten or fifteen minutes of paresis. Prostigmin bears a close resemblance to a true physiological antidote to curare since it acts to inhibit choline esterase and restore the acetylcholine preponderance at the myoneural junction. For this reason an ampoule of prostigmin should always be available when curare is used, although in our experience it has never been necessary to use it.

Apparently curare produces no analgesia, although the investigation of its action in this regard when given in full doses remains to be determined. I gave 5 c.c. of intocostin (100 mgm. curare) to one patient who was conscious, in order to demonstrate the effect on chronic muscular spasticity. He became almost completely paralyzed, particularly in the muscles of tongue and throat, and he had a terrifying sensation of impending death, although there was no respiratory depression or anoxia. So far as I could tell there was no analgesia. In twenty minutes he was completely restored to normal, spasticity and all, but he did not come back for another treatment. Because of the unpleasant subjective sensation of paralysis I do not recommend curare for use in full doses to conscious patients or to patients in whom spinal anaesthesia is wearing off unless they are very well sedated or a supplementary general anaesthetic is given. We have found, however, in agreement with Cullen and others, that curare may be very useful to facilitate bronchoscopy in a resistant muscular patient even when he is not asleep. In this situation the patient is probably so much concerned with the unpleasantness of the insertion of the bronchoscope that he does not notice the muscular paralysis.

In our experience curare has proved most useful in securing complete abdominal muscular relaxation in patients under general anaesthesia, usually cyclopropane. We give it intravenously at any time during the operation when we see that extra relaxation would be advantageous. Cullen advocates its routine use in abdominal surgery, making the injection at about the same time as the skin incision, and repeating it if necessary during the operation. I have come to

have so much confidence in the safety of curare that I have no objection to this technique, but in our experience relaxation continues to be satisfactory with cyclopropane alone in the majority of our cases. Now we use curare rather than push the cyclopropane, but even under these circumstances we are using curare in less than one-fifth of our abdominal operations. The following table presents an analysis of the use of curare in 1,000 consecutive operations at our hospital:

Total operations .....	1,000	Curare used in .....	86 or 8.6%
Abdominal operations .....	478	“ “ “ .....	79 or 16.5%
Appendectomies .....	228	“ “ “ .....	23 or 10.1%
Hysterectomies .....	67	“ “ “ .....	22 or 32.8%
Gall bladder and stomach .....	42	“ “ “ .....	19 or 45.2%
Other abdominal .....	141	“ “ “ .....	15 or 10.6%
		Bowel resection .....	4
		Exploratory laparotomy ...	2
		Colostomy .....	2
		Herniotomy .....	3
		Salpingectomy, etc. ....	4
Extra-abdominal operations .....	522	Curare used in .....	7 or 1.3%
		Hæmorrhoidectomy .....	1
		Tonsillectomy .....	1
		Thyroidectomy .....	1
		Bronchoscopy .....	2
		Œsophagoscopy .....	1
		Manipulation of foot .....	1

It is noted that curare is, as might be expected, more often needed for upper abdominal and for pelvic surgery than for ordinary appendectomies, and in the extra-abdominal cases it has been usually to facilitate endotracheal intubation.

In all our cases curare has been given intravenously. The effect is produced within a few seconds, reaches its peak in two or three minutes and gradually wears off in fifteen or twenty minutes. When the patient is under general anæsthesia it is usually hard to say just exactly how much of the relaxation is due to the curare and how much to the anæsthetic agent and we have ordinarily been able to maintain satisfactory relaxation with cyclopropane throughout the whole operation following one injection of curare. However, if more relaxation is needed there is no objection to repeating the dose. I have done so a few times, and Cullen has given a second dose many times without any bad effect. Curare may be injected intramuscularly, but I have not used it this way in anæsthesia since it has seemed to me that the effect would be less certain and more difficult to control. Intocostrin is not irritating to subcutaneous tissues and I have seen no phlebitis or other reaction following any of our injections.

To the average adult patient I usually give a dose of 5 c.c. of intocostrin (100 mgm. curare)

in one intravenous injection. This has proved to be adequate in almost every case, and has had no harmful effect in any case except occasional respiratory depression, which, as I have said, is easily controlled. It is a simpler method than to give fractional doses according to the patient's requirement, as recommended by Cullen. Too small a dose will lead to disappointing results, as was the case with some of the earlier investigators; it is the old story of sending a boy on a man's errand. The doses being used

in psychiatry for the minimizing of convulsion trauma are smaller than we recommend in anæsthesia, but I believe that in the operating room with facilities always at hand for the control of respiration the conditions are safer for large dosage than in most mental hospitals. Our patients have varied in age from 12 to 75 years, and the dose should be reduced in proportion to the weight of a child or to factors of frailness and asthenia in the aged. I believe that curare may safely be used with babies and quite small children, but I have had no experience along those lines and I await with interest the reports of other workers.

As I have said, almost all our patients have been under cyclopropane anæsthesia with no added ether or other anæsthetic agent. There is no doubt that curare works ideally in combination with cyclopropane. I think, however, that it may be used safely with other agents, particularly with nitrous oxide and ethylene. Cullen has shown that with ether the dose of curare should be reduced to one-third of that usually used during cyclopropane anæsthesia. Experimental studies have shown that this is because ether itself has a marked curariform action, and that the myo-neural junction is already partially paralyzed. If this factor is kept in mind curare may be used satisfactorily



during ether anaesthesia, and relaxation and a quiet abdomen obtained without deep anaesthesia.

I have used curare in conjunction with sodium pentothal in only one case, but Dr. Fernando Hudon, of Quebec,<sup>9</sup> who uses pentothal for much abdominal surgery, has obtained excellent results with the combination of intocostin and pentothal in a fairly large series of cases. There seems to be no significant change in respiration and pulmonary ventilation with this combination.

Preoperative medication does not seem to have any effect on curare action. Cullen has stated that atropine or scopolamine is apparently essential in the premedication. Our experience has not borne out this theory, as at least half of our patients have received neither of these drugs, and I can see no difference in the curare action. Nor have we had any special difficulty with hypersecretion of mucus which might be attributed to curare. About 10% of our curare patients received a moderate dose of avertin previous to cyclopropane, and here again there has been no significant change in the curare effect. The complete absence of all postoperative effects from curare has been one of the most striking and encouraging features of this whole investigation. This has been true in my own experience and is recorded by everyone else whose reports I have heard.

What may the future hold as to the place of curare in anaesthesia? A much longer and wider clinical and laboratory investigation must take place before this point can be finally settled. However, in view of our experience so far I venture to predict that curare will have the effect of:

Firstly, reducing the demand for spinal anaesthesia with its attendant hazards and complications, since the reason for many spinal anaesthetics is that adequate abdominal relaxation may be obtained; and secondly, increasing the incidence of pure cyclopropane or pentothal anaesthesia, without the addition of ether, for abdominal surgery, thus reducing postoperative complications.

Surgeons who have been able to overcome their detective story dread of curare, "the arrow poison", and have allowed us to use it on their patients, are unanimously enthusiastic about the results obtained. I would like to add a word of thanks to those long-suffering surgeons of my own hospital who have put up for many years with my tinkering in anaesthesia. Without their

co-operation none of what I may have accomplished would have been possible. I am glad that at last I have been able to give them something which not only keeps their patients alive but keeps their own blood pressures down and makes their work easier. One word more of caution—the anaesthetist is still more important than the agent used, and curare is not a plaything for the inexperienced.

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## A NEW ROCKER TYPE OF CAST-WALKER\*

(Preliminary Report)

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NUMEROUS fracture cases have been admitted from overseas and other centres in Canada to the surgical service at the Montreal Military Hospital. Many of these cases have come to the hospital in walking casts. During the past ten months, we have been impressed with the variety of walking appliances which have been used. From the beginning, the impracticability of various types of apparatus in use has been evident. Therefore, some months ago, we attempted to find a better type of cast-walker and have slowly developed the apparatus which will be described below.

A review of the literature revealed that very little has been published on this subject for the past ten years.

\* This work was conducted on the Surgical Service of Major Vineberg at the Montreal Military Hospital, Ste. Anne de Bellevue, Que.

Lawson,<sup>1</sup> 1943, reported a detachable apparatus which he named "sabot". This consisted of a wood and metal shaped sandal which was strapped on to the cast. On its under surface there was a small rounded piece of wood placed crosswise which served as a roller.

Stamm,<sup>2</sup> 1943, described an interesting piece of apparatus. It, however, is difficult to make, particularly in an Army hospital. In addition, it appears to be too narrow for good stability. It consists essentially of a wooden base to which is attached a metal rocker  $1\frac{1}{2}$ " wide and  $\frac{1}{8}$ "

is seldom properly applied. We have seen the caliper frequently placed too high and too far back (see Fig. 1) resulting in instability and severe external rotation of the leg during extension of the lower extremity.

In other cases the caliper has been placed too low and too far back (see Fig. 2) resulting in damage to the toes and the sole of the foot.

The caliper frequently breaks at its lowermost part (cross bar) or one of the arms breaks through the cast (see Fig. 2). In fact, we have had one instance in which the caliper broke

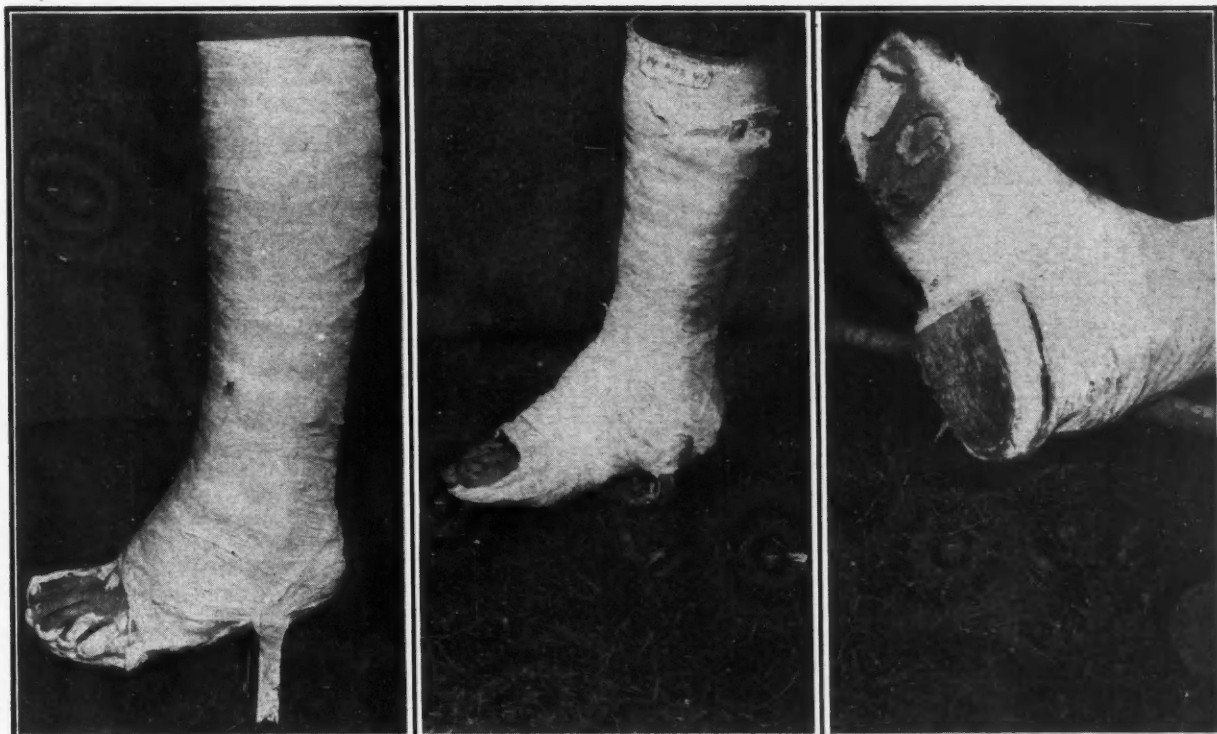


Fig. 1

Fig. 2

Fig. 3

Fig. 1.—Caliper too high and too far back. Note external rotation. Fig. 2.—Caliper too low and too far back. Note external rotation and injured toe piece. Note that caliper arm has perforated cast. Fig. 3.—Wood and plaster heel badly worn and toe piece severely damaged.

thick. This metal rocker is either bolted or riveted to the wooden base and is covered by a piece of leather tread.

Bush,<sup>3</sup> 1944, a few months ago presented a type of rocker consisting of a section of wood measuring 1" by 1" by 8" and which was incorporated in plaster and walked upon.

After studying the defects inherent in the various types of cast-walker, we designed a new type of "rocker cast-walker". We have also studied various types of cast-walkers applied at other centres. The defects in these seemed most obvious. For example:

(a) *Walking caliper*.—Although most popular and widely used throughout North America, it

through the cast and bruised the underlying leg.

(b) *Plaster, felt or wooden heel*.—This type of walking appliance applied to a non-padded cast in our experience invariably has resulted in a completely unstable base. The heel bends or loosens and in some cases wears away from the cast (see Fig. 3).

*Rocker type of cast-walker*.—The rocker type of cast-walker developed and used by us is designed to avoid as far as possible the defects apparent in other types. It has been in use for approximately six months and has proved most satisfactory under conditions found in a casualty retraining centre.



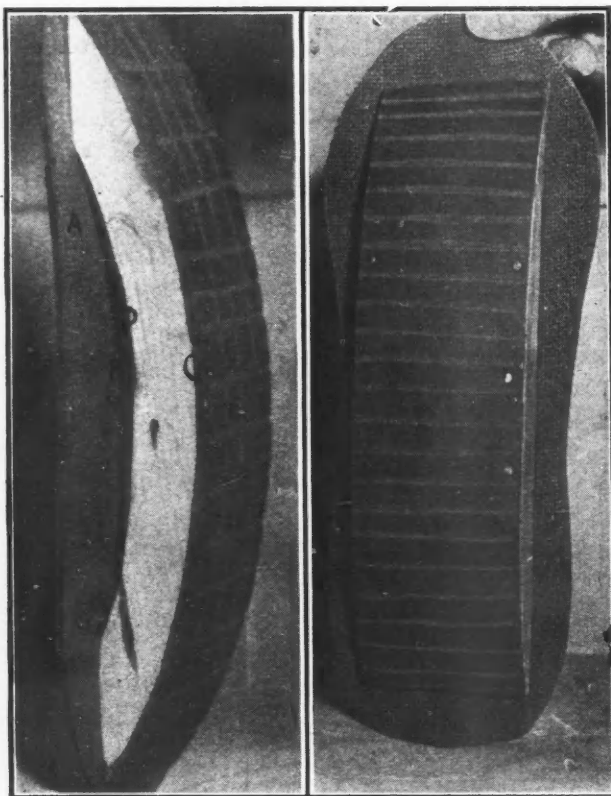


Fig. 4

Fig. 5

Figs. 4 and 5.—Fibre plate (A) as base with attached wood rocker, (C) lining of furrowed linoleum, (E) covers rocker. Note trough (F) through which is passed plaster slabs.

Many of the patients on whom it has been used have had previous experience with other types of cast-walker appliances, and have voluntarily remarked favourably upon this rocker type.

*Description* (see Figs. 4 and 5).—Base:\* Consists of a fibre plate  $\frac{1}{4}$ " thick (A) which is cut to the shape of the foot. It is attached to the rocker portion by two metal screws.

Rocker: A piece of wood cut with a convex lower surface (C) and a concave upper surface (D) which is  $4\frac{1}{2}$ " wide and 10" long. On the convex lower surface furrowed linoleum or rubber is attached so as to completely cover it (E).

Note that between the rocker and the base there is a space or trough (F).

*Application*.—The base of the rocker is applied squarely to the plaster covering the sole of the foot. It should be placed so that the base is directly at right angles to the long axis of the leg. Any irregularities caused by the plaster cast are filled in with plaster in order to obtain the desired position. The base is attached to

\* Some of our casts have broken above the ankle. In the past 2 months this defect has been overcome by shortening the front of the fibre base (A). The new rocker has been made with the fibre base plate (A) level with the front end of the rocker (C). No casts have broken since the new type of rocker has been used. The linoleum has been replaced by rubber. The latest rockers have stood up well under snow and ice conditions.



Fig. 6

Fig. 7

Fig. 8

Fig. 6.—After 8 weeks at casualty retraining centre. Figs. 7 and 8.—Below the knee cast with rocker attachment.

the cast by slabs of gauze impregnated with plaster of Paris, which are passed through the trough (Fig. 5 (F)) and up over the dorsum of the casted foot and about the ankle. Finally the base is further secured to the cast by a few circular plaster bandages.

As in other types of appliances fixed by plaster, the cast must be dried by baking and weight bearing avoided for 24 hours.

Patients are instructed to have a one inch lift placed under the sole and heel of the opposite boot. This prevents a tilt of the pelvis which is undesirable.

#### TYPE OF CASE

The "rocker cast-walker" has been used satisfactorily in fractures below the knee including those cases which require fixation to mid thigh. We have had one patient with both lower extremities fractured (see Fig. 6) who had rockers applied.

Patients wearing these rockers have proceeded to a casualty retraining centre, where they have rocked over stones and ditches, etc., for 6 to 9 weeks. We would like to point out that the majority of our cases are returned to us for removal of their casts. Thus, we have been able to observe the effect of walking on the casts and on the rockers.

Occasionally a cast has cracked in the lower 1/3 of the leg and has required reinforcement. Otherwise, there have been no reported difficulties.

In many cases the linoleum or rubber has been almost worn out. When this happens they have rocked along quite satisfactorily, on the wood.

*Features of the "rocker cast-walker"* (see Figs. 7 and 8).—Locomotion: The patient rocks comfortably and does not stomp along. It allows true heel to toe action and does away with external rotation tendencies.

*Stability:* Because of its breadth and shape it affords stability while standing or walking.

*Protection:* The toes and metatarsal arch are well protected by the broad fibre base which is not the case in the walking caliper.

*Weight and strength:* It is relatively light and sturdy.

*Cost:* The device is inexpensive and simple to construct. The rockers have been made by the patients themselves under the supervision of the Department of Occupational Therapy.

#### SUMMARY

1. A new type of "rocker cast-walker" is presented.
2. It has been used satisfactorily in all types of below the knee fractures.
3. This rocker is easily applied to the foot of a cast and affords good locomotion, stability and foot protection.
4. It is sturdy, light and is easily and cheaply made.

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### HÆMORRHAGIC DISEASE OF THE NEWBORN\*

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WITH the discovery of vitamin K, and the development of tests for the prothrombin content of the blood, many investigators became interested in this syndrome. At the present time, the etiology, prophylaxis and treatment of hæmorrhagic disease are much better understood but still there is much to be learned. It has been suggested that a better name for this loose clinical syndrome would be "hypoprothrombinæmia of the newborn". This might solve the controversy as to what types of hæmorrhage should be included in this disease. Some authors include under the name of hæmorrhagic disease, cerebral hæmorrhage, cephalhæmatoma, conjunctival and retinal hæmorrhage, spitting up of blood or hæmatinic crystals, cord oozing, petechial hæmorrhages, blood in the stool, and vaginal bleeding, without recording the prothrombin level in the blood or the bleeding and clotting time. Other authors only include in their reports hæmorrhages which are associated with changes in the coagulation of the blood. It is obvious that the incidence of the disease will be high in the former and low in the latter.

Knowledge concerning the danger of hæmorrhage in the newborn dates back to ancient

\* Read at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Section of Pædiatrics, Toronto, Ont., May 24, 1944.



times. In Genesis one finds the Mosaic law specifically setting the eighth day after birth as the time for circumcision. Numerous repetitions of this law are found in the Old and New Testaments.

The cause of hæmorrhagic disease in newborn babies baffled the early investigators. One of the most important observations was made by Whipple<sup>1</sup> in 1913, who found a complete absence of prothrombin in a fatal case of the disease. In 1921 Rodda<sup>2</sup> made the interesting observation that the coagulation time of babies had a tendency to increase after birth, reaching the maximum retardation on the fifth day, but returning to normal before the tenth day. In 1934 an antihæmorrhagic vitamin, vitamin K, was discovered by Dam in Denmark. In the following year a relationship between this vitamin and the prothrombin level of the blood was demonstrated.

According to the now widely accepted theory of the mechanism of blood coagulation, clotting involves the conversion of prothrombin to thrombin, which unites with fibrinogen to form fibrin, the structural basis of the clot. Vitamin K is essential to a normal prothrombin concentration, and so is itself fundamental in the physiological mechanism of clotting.

With the recognition of the importance of prothrombin deficiency as a cause of hæmorrhage, and the discovery that vitamin K is essential for the synthesis of this clotting factor, there came a new approach to the study of this disease. Quick, in 1935 developed a method for estimating the prothrombin level on the blood, and in 1939 showed that at birth the prothrombin level is relatively high, but often drops precipitously during the first days of life, and then spontaneously is restored.<sup>3</sup> This observation was concurred in by other workers. Thus it seems that hæmorrhagic disease of the newborn is a potential threat to all infants. Consequently if an infant should bleed accidentally the amount of blood lost may be sufficient to reduce the prothrombin level still further, to a point where hæmorrhage becomes difficult to control, and a vicious circle is initiated.

The final step in the linking of this hypoprothrombinæmia to hæmorrhagic disease of the newborn would logically consist of associating an extremely low prothrombin with a clinical picture of hæmorrhage, and a response to vitamin K therapy. This work has been done by

many students in the field. A prompt increase in the prothrombin level of the blood, and cure of actual cases of hæmorrhagic disease of the newborn have been demonstrated following the administration of vitamin K.

At this point one can say that hæmorrhagic disease of the newborn is clinically recognized by external or internal hæmorrhage, occurring during the first few days of life; is characterized by an exceedingly low prothrombin content of the blood; is usually self limited, but may be fatal; and is promptly controlled by vitamin K, although lost blood and prothrombin, in cases of large hæmorrhage, may have to be replaced by blood transfusion.

The ordinary tests for bleeding and clotting appear to reveal the abnormality of the blood only when the prothrombin deficiency is extreme, and may give normal values when the prothrombin levels are merely approaching the danger zone. Various modifications of the Quick<sup>4</sup> method are popularly used. A practical micro method described by Hoffman and Custer<sup>5</sup> is quite accurate and is probably the method of choice in the newborn.

#### PROPHYLACTIC TREATMENT

Since no evidence exists that the baby is born with a marked deficiency of prothrombin, it is important to prevent the fall of this factor.

It has been shown<sup>6</sup> that by giving vitamin K orally or parenterally to the mother before delivery, the prothrombin level of the cord blood and the infant's blood is higher than in the case of untreated mothers. Also that the infants of treated mothers do not have the fall in the prothrombin level which usually occurs after the first day. The lower incidence of hæmorrhagic disease in the more favoured classes may be due to the fuller diet, containing some vitamin K, taken by these mothers. The richest sources of vitamin K among food stuffs are green leaves of any kind, tomatoes, hog liver, and some cheeses.

Clinical results also have been convincing as to the value of vitamin K in preventing hæmorrhagic disease. It is most dramatic to see hæmorrhage from the umbilicus, or hæmatemesis, stop abruptly within an hour or two of the administration of this vitamin.

Intracranial hæmorrhage seems to be less frequent in infants whose mothers have had vitamin K. Because of its frequency and disastrous consequences, this condition causes the greatest

concern. Possibly trauma is not the most important factor in many of these cases. Symptoms and signs of intracranial hæmorrhage frequently are not observed until many hours after delivery, and this suggests slow hæmorrhage from a small bleeding point. It has been shown that, by giving vitamin K immediately after birth, this bleeding may be checked, which might otherwise cause death or permanent physical and mental crippling. Recently evidence has been given in a series of 1,000 live births, that the incidence of intracranial hæmorrhage has dropped from 9.8 to 7.1.<sup>8</sup> However, miracles should not be expected from the use of this vitamin. It is well recognized that the production of a normal clot is only one of the factors in the control of hæmorrhage. The permeability and fragility of the capillaries must also play an important rôle.

It seems a fair assumption that trauma will continue to be the predominant cause of intracranial hæmorrhage in the newborn. It is, however, a logical assumption to add the statement that infants subjected to some degree of injury may fail to develop a significant hæmorrhage unless a marked decrease in the prothrombin level of the blood is present. Similarly, a mild hæmorrhage may become marked as the physiological decrease in prothrombin develops 48 to 72 hours subsequent to delivery. From this standpoint, the administration of vitamin K during the early neonatal period or, preferably to the mother before delivery, should afford some increased protection to the infant.

Barbiturates given to the mother as an analgesic during delivery or labour have been shown by some workers<sup>9</sup> to accentuate the prothrombin deficiency in the newborn. Other reports<sup>10</sup> have not been able to demonstrate this effect. Prolonged anæsthesia may also reduce the already low prothrombin level. Vitamin K given to the mother will prevent these undesirable results.

Prematures have a lower prothrombin level than full term infants.<sup>11, 12, 13</sup> They also show a higher incidence of cerebral hæmorrhage. Vitamin K therefore is most necessary for the mother when prematurity of the baby is expected.

It is known that vitamin K is synthesized in the intestine by the normal bacterial flora of the intestine. In the newborn the gut is quite free of bacteria until food is taken. With the ingestion of milk, which furnishes a nourishing substratum, these bacteria enter very quickly by mouth and by anus. Reports have shown<sup>14</sup> that

the giving of cow's milk or breast milk in the first two days of life will increase the prothrombin level of the blood. It would seem more physiological that breast milk should be given, especially since colostrum is high in globulin, and globulin is in some way related to prothrombin.

The estimation of bleeding and clotting times, and recently prothrombin levels on all newborns, as advocated by some, is an unnecessary procedure. The administration of vitamin K to the mother or to the newborn infant will hold the prothrombin almost at normal level throughout the newborn period.

If surgical operations are necessary within the first week of life, the infant should be protected against hæmorrhage by the preoperative administration of vitamin K.

The prophylactic dose for the mother should be 5 mgm. of synthetic vitamin K, either parenterally or orally, at least two hours and not over twelve hours before delivery. If the delivery is prolonged over twelve hours the dose should be repeated. If it is expected that delivery will take place less than two hours after the administration of the vitamin, the dose should be given intravenously.

#### ACTIVE TREATMENT

Before the cause of hæmorrhagic disease was known, treatment could not be specific. Early workers attempted merely to treat the bleeding with styptics and astringent agents, and injections of gelatin solutions. Lambert<sup>15</sup> in 1908 successfully cured a bleeding baby with a direct transfusion of blood. Welch<sup>16</sup> in 1910, reported a series of twelve cases treated both by direct transfusion and by subcutaneous injections of blood. Schloss and Commiskey<sup>17</sup> introduced the method of injecting small amounts of blood intramuscularly. These workers however, recognized the difficulty of evaluating the efficacy of this treatment, because of the fact that spontaneous recovery could occur. In fact, they reported in a later paper<sup>18</sup> a case in which the baby died in spite of several injections of blood. Soresi<sup>19</sup> advocated direct transfusion as the best method.

Recently it has been shown<sup>20, 21</sup> that the once popular intramuscular injection of 10 to 20 c.c. of whole blood has little or no effect on the coagulation elements, and on the lessening of the coagulation time. The simplicity of this treatment was its greatest asset, but its apparent effectiveness lay in the fact that most of

the cases of hæmorrhagic disease are mild and tend to heal spontaneously.

Blood transfusions are a necessity when there has been a large loss of blood with a fall in the hæmoglobin. Using one of the parents as a donor eliminates the necessity of a Wassermann or Kahn test. It has been stated that the blood of the mother is not as suitable as that of the father or an outsider. If the blood is given intravenously, which is by far the best method when at all possible, it must be about 15 c.c. per lb. Intraperitoneal injections of approximately 50 c.c. of untyped blood is a less effective method, which may be used if the intravenous route is not possible. Blood transfusion may show only a transient improvement in the child, since the effect is achieved merely by passive addition of prothrombin with the transfused blood. This additional prothrombin disappears from the blood within 12 to 24 hours, and so the transfusion may have to be repeated daily if the hæmorrhage is not under control.

The value of vitamin K in the relief of bleeding in hæmorrhagic disease seems to be now definitely established. It may be given by mouth or intramuscularly. By mouth, results are seen in from 3 to 4 hours, whereas by intramuscular injection, the reaction takes place in 1 to 2 hours. An adequate dose by either route is 2 mgm. of synthetic vitamin K. The intramuscular injection is preferable in severe cases since the possibility of loss by vomiting is eliminated. If the bleeding continues this may be repeated in 12 hours or more. However, the one treatment is practically always sufficient, the results being dramatic and permanent.

#### CONCLUSIONS

1. The syndrome called "hæmorrhagic disease of the newborn" is due to the low prothrombin level in the blood of the newborn. A better name for this syndrome would be "hypoprothrombinæmia of the newborn".

2. The administration of vitamin K to the mother, or to the infant within the first few hours of delivery, will prevent hypoprothrombinæmia. If possible, it should be given to the mother, rather than to the baby.

3. Evidence is accumulating in favour of a lowered incidence of intracranial hæmorrhage in the newborn when vitamin K has been given.

4. Vitamin K quickly increases the level of prothrombin in the blood, and controls the hæmorrhage in hæmorrhagic disease. In cases

where there has been a large loss of blood, blood transfusion is necessary to replace the lost prothrombin, and restore the blood volume.

5. "Hæmorrhagic disease of the newborn" or "hypoprothrombinæmia of the newborn" may be added to the ever-growing list of preventable diseases. It may be considered a deficiency disease due to avitaminosis K.

6. A plea is made that all mothers be given vitamin K before delivery, failing that, every infant should have vitamin K as early as possible after birth.

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#### VASOMOTOR RHINITIS\*

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THE more one studies the condition known as "vasomotor rhinitis" the more one realizes that the subject is far-reaching and covers a great number of inter-related conditions and symptoms. In this paper we are only attempting to discuss the condition briefly and in a manner such as one would meet in ordinary practice.

We have noted a great rise in the number of cases that have come through our office in the last three or four years and we cannot help but feel that it is in some way related to the worries and frustrations, stresses and strains and the hopeless and helpless feelings that the average person experiences during these trying times.

\* Read at the Seventy-fifth Annual Meeting of the Canadian Medical Association, Section of Otolaryngology, Toronto, Ont., May, 25, 1944.



The vast majority of these cases are women and in most instances a careful history will bring out the fact that these women are worried and upset by the war. Homes have been broken up, loved ones have been killed or are missing and in many instances they have not been actually hurt by the war, but are living under such deplorable circumstances and conditions due to the congestion and housing conditions that they become quite discouraged and depressed with their lot in life.

In reviewing the literature we have come across articles by such outstanding men as Goodale,<sup>1</sup> Hansel,<sup>2</sup> Tobey,<sup>3</sup> Gottlieb,<sup>4</sup> Pressman,<sup>5</sup> Fox and Fabricant,<sup>6</sup> Stovin<sup>7</sup> and others. They have all tried to classify the condition as acute or chronic, allergic or non-allergic. We have attempted to classify the condition according to what we feel are the *factors*.

#### SYMPTOMS

The patient usually complains of sneezing, blocked nasal passages, post-nasal drip, a great deal of watery nasal discharge and the feeling of having constant or repeated head colds. He may complain of a sensation of smothering due to his inability to breathe through his nose. This may be accompanied by dryness of the throat and pharynx. The patient may also complain of congestive fullness at the root of the nose, fullness and soreness in the region of one or both antra, and the gradual onset of vague frontal headaches, which are not definite as to location, and which do not show any tenderness when pressure is exerted. X-rays are generally negative. Tremble<sup>8</sup> refers to this as "Headaches of nasal origin". Sometimes a cough is present, due to the irritation of the post-nasal drip. Occasionally the patient will complain bitterly that the condition is getting him down and that he cannot much longer stand the constant feeling of smothering and inability to breathe through his nose. Many patients are referred for treatment for sinusitis and are found to be suffering from vasomotor rhinitis.

Examination reveals the nasal mucous membrane to be either (a) beefy-red in colour, differing somewhat in colour from the pinkish-red one generally finds in acute inflammatory conditions, and (b) pale and bluish-tinged, swollen, engorged and waterlogged.

The mucous membrane will shrink down in both instances when one of the common vasoconstrictors are used: (a) is the more acute

form. The nasal mucous membranes are generally very hypersensitive and the patient resents instrumentation. (b) Is the more chronic form.

We feel that vasomotor rhinitis is a local nasal mucous membrane manifestation of a generalized nervous imbalance, is not found in normal happy people and would disappear if the normal vasomotor balance were righted.

#### PHYSIOLOGY

The vasomotor system of the nose is considered as a complex and unstable mechanism, which involves a balance between arteriomotor, venomotor and capillomotor nerve fibres, and chemical substances exerting regulatory influences.

The stroma of the nasal mucosa contains great numbers of mucus-secreting glands and has an extremely rich blood supply, particularly in the region of the middle and inferior turbinate bones. The blood vessels and glands in the stroma are innervated by the autonomic nervous system through two separate and antagonistic sets of fibres, the vasoconstrictors and the vasodilators.<sup>7</sup>

The vasoconstrictor fibres consist of preganglionic fibres from the central nervous system and postganglionic fibres arising from cells of sympathetic ganglia.<sup>9</sup> These nerves exhibit a constant tonic activity and the centre in the medulla may be stimulated reflexly through the sensory nerves. The efferent fibres, which cause vasoconstriction are called pressor fibres, and those which cause vasodilatation are called depressor fibres. The pressor and depressor fibres may be stimulated under different circumstances. The vasoconstrictor fibres arise chiefly from the cervical sympathetic ganglia.

Ordinarily a normal physiological antagonism is maintained and dilatation and constriction may occur according to the ebb and flow of physiological needs. However, in vasomotor rhinitis there is an apparent stimulation of the parasympathetics, causing an increased vasodilatation. Accompanying this vasodilatation is an increased permeability of the capillaries which causes the characteristic oedema of the nasal mucosa. This oedema is considered an outpouring of interstitial fluid into the spaces between the fibres of the stroma of the mucous membrane.

According to Stovin, the interstitial fluid contains large quantities of sodium as a base and he suggests that the presence of oedema has some connection with the amount of sodium in the body fluids. Stovin<sup>7</sup> also suggests that "the agent which maintains control over the sodium in the body seems to be of hormonal nature, probably originating in the adrenal cortex".

#### FACTORS

We have divided these into (a) extrinsic and (b) intrinsic.

(a) *Extrinsic factors*.—Under this heading we place all external factors, or those factors which tend to irritate the nasal mucous membranes from without.

1. Allergens and inhalants. Many things tend to irritate the nasal mucous membrane when breathed or sprayed in. Pollens, dusts, danders, hair, certain odours, smoke, fumes or vapours are among these. Any of our common nasal sprays tend to cause irritation after constant and

repeated use. The condition often clears up when these are discontinued.

2. Weather conditions. We find that many people are very decidedly affected by weather changes. The chief offender seems to be cold, damp, wet weather, but extremely cold or dusty weather seems to upset them also. There also seems to be a seasonal variation in the discomfort of certain individuals.

3. Barometric pressure. We must confess we have difficulty in explaining this one, but we do find that certain people are comfortable at high altitudes and have trouble down at low levels. Others enjoy the sea-shore while some do not. In our office we have an old water barometer and when the pressure is high we can almost invariably tell beforehand which one of our old vasomotor patients will call for an appointment.

(b) *Intrinsic factors.*—Under this heading we attempt to enumerate those factors which are found within the patients themselves.

1. Local conditions of nose and sinuses. Here we may enumerate many conditions, but briefly we will mention deviated septum, nasal polypi, polypoidal turbinate bones, polypoidal posterior tips, infections of the sinuses and various other factors which tend to produce repeated head colds.

2. Allergy. A careful history will generally reveal that there is a familial background of allergy. Previous attacks of asthma, hay fever, chronic bronchitis, or hives may be admitted. Acute attacks of nasal congestion are sometimes noted when certain foods are eaten. The patient should be questioned as to feather pillows, fur coats, new rugs on the floor, flowers and also the various household pets. A check should be made regarding occupation since certain allergic reactions are found connected with certain occupations. Under this, one would group chemicals, fumes, dusts, dampness, dryness and cold. Hansel<sup>9</sup> suggests the importance of investigation for bacterial allergy.

3. Psychic disturbances. This is really psychosomatic medicine, but we feel that it is actually the chief cause of most of our trouble. One might say that it covers a multitude of sins. Family and close personal affairs must be taken into account. One often finds a personal sex factor as the background. Conditions such as lonesomeness, boredom, temper, groundless fears, mental and physical fatigue, frustration, and sheer boredom with the tedious rounds

of humdrum life cause more trouble than is generally suspected.

4. Endocrine. I feel that under this heading can be put most of the factors concerned with most of our vasomotor conditions. A great deal is yet to be learned in the realm of endocrine balance, disturbance and adjustment. Novak and Hollender<sup>10</sup> mention parathyroid glands in relation to hyperæsthetic rhinitis. We have found, peculiarly enough, that most of our cases of vasomotor rhinitis are found in the female, and we all know that the endocrine glands play a tremendous part in the life cycle of the female. Both excessive production of oestrogenic hormone and lack of oestrogenic hormone seem to be factors in the condition. A good example of excessive hormonal stimulation is the well-known condition known as "honeymoon cold". Endocrine disturbance is found mostly during:

(a) Adolescence. We find a certain amount of vasomotor rhinitis in adolescent boys and girls, particularly around ages 15 to 18. There is generally a great endocrine disturbance at this stage of development with an excessive production of oestrogenic hormone. This is a good example of the naso-genital relationship as cited by Mortimer.<sup>11</sup> This type of vasomotor rhinitis tends to clear up as development takes place.

(b) Pregnancy. We have found that pregnancy is a very definite factor in the production of nasal congestion. Mortimer, Wright and Collip<sup>12</sup> have done a great deal of very good work on this, and definitely point out that nasal congestion is greatly increased during this period. Generally the condition clears up at delivery. It is significant that the bluish tinge of the nasal mucosa closely resembles the bluish tinge of the vaginal mucosa during pregnancy.

(c) Menopause. Here again, great endocrine changes take place. There would appear to be a lack of oestrogen in this case due to beginning atrophy of the ovaries. Patients going through the trials and tribulations of menopausal upsets and discomforts so often complain of nasal congestion.

(d) Ovarian dysfunction. Under this heading we place those women who have been married for many years but so far have been unable to have children and are either considered sterile or "incompatible". Also we have that large group who have undergone surgical operations on tubes, ovaries or uterus.

5. Heredity. This seems to play a part. Often we find a patient who casually reports that one of his relatives was always troubled with his nose in much the same manner as he is.

#### GENERAL TREATMENT

*Psychotherapy.*—The first thing which we try to impress upon our patients is the importance of "peace of mind". It is more or less futile to waste too much time on treatment until you have the patient straightened out mentally. Too much stress cannot be laid upon this one factor. Psychologists tell us that the only way to overcome complexes and frustrations is to bring the causes out into the open. It is amazing the number of cures which take place once tension and strain is removed from the patient's mind. Some people have only imaginary ills and worries. Confession is sometimes good for the soul.

*Endocrine therapy.*—Our own personal feeling is that every one of these patients has an endocrine disturbance. If convenient, we think that an endocrinologist could help to a great extent. Judicious use of the various sex hormones has given great relief to many of our patients. Treatment of the thyroid gland often helps. In the case of the adolescent, we do not advise active treatment, as the condition tends to lessen and disappear as the patient matures and develops. The pregnant patient will cure herself with delivery.

*Drug therapy.*—A great deal of relief can be given by the judicious use of the various drugs now available.

(a) Ephedrine is used a great deal to relieve the congestion of the nose. It should not be used too constantly as patients have a tendency to become sensitive to it. Aqueous solutions seem better than oily solutions. Neo-synephrine HCl  $\frac{1}{4}\%$  solution seems to be very good in the great majority of cases. Privine is very good in selected cases, but we have found a great tendency to sensitivity.

(b) Sedatives seem to be of great benefit, particularly with the nervous, high-strung patient. Phenobarbital seems to be of benefit and luminal is a favourite. We have found belladonal (Sandoz) of particular benefit as it combines the sedative effect of luminal along with the drying effect of belladonna.

(c) Sodium sulfathiazole solution seemed to enjoy general favour for a while. We never found this to be of any great benefit in any of the sensitivities or allergic conditions. There

are many types and combinations but unless a definite infectious condition is present, we do not feel that any benefit can be given by its use.

(d) Atropine in smallish doses has been used, and tends to relieve the watery congestion. It should not be used over a long period of time as it tends to have cumulative effects. We have used it to a great extent in combination with ergotamine tartrate and have had excellent results in controlling some of the headaches that seem to be so often present with the condition.

(e) Histamine is being used more and more in the treatment of this condition and seems to give good results in certain conditions. We feel that best results are obtained where weather plays a part. We have been using histamine diphosphate hypodermically and feel that it is definitely one of the drugs that should be tried. Torantil is also used by mouth but the results do not seem to be as good. Torantil is a histaminase and is used on the theory that too much histamine in the body cells causes the watery congestion and the histaminase will assist the natural mechanism by which histamine is destroyed.

(f) Nicotinic acid is now being used with varying results. We have tried to give large doses (50 mgm. four times daily) but often the patient complains of flushes and light-headedness. This is probably due to the vasodilatation effect of the nicotinic acid, and the treatment generally has to be stopped. However the use of nicotinic acid amide does not give this vasodilatation effect and the results are often worth the trial.

*Diet.*—We doubt if diet plays a great part in the treatment of these patients. Many enthusiasts and cranks try fancy diets, but their results are not startling. Fruit juice diets seem to be popular but futile. Many people seem to think that milk produces more mucus. We have used a salt-free diet as advocated by Furstenburg and have replaced the sodium with either ammonium or potassium. In many cases the results seem to justify the treatment. The waterlogging of the membranes seemed to be relieved. Judicious use of vitamins, iron tonics, yeasts, etc., is advocated.

*Vaccines.*—If a definite infection is present, we feel that these help considerably. Rackemann<sup>14</sup> suggests the use of vaccines, even in allergic conditions. Selective vaccines rather than stock seem to be preferred. We have had only fair results with oral vaccines. Feinberg



in his book suggests that fungi are the causal agents of vasomotor rhinitis.

#### LOCAL THERAPY

These patients are always very anxious to have their condition cleared up, as they generally have gone through considerable torment with a stuffed nose. Consequently, they are generally willing to undergo any nasal surgery suggested by the surgeon. We wish to emphasize the need of conservatism, otherwise the surgeon as well as the patient will have many postoperative headaches.

Removal of all nasal polypi is essential, and quite often when a single polypus is the cause of the trouble, its removal will cure the condition. Cauterization of polypoidal turbinate bones is of benefit but care should be taken not to remove too much of the mucosa, as atrophy may result. Radium may be inserted into the nose to prevent recurrence of polypi. This should be done only under direction of a trained radiologist.

Deviation of the septum is quite often the cause of a great deal of nasal discomfort. We continue to do submucous resections on these cases which we feel need the operation. Unfortunately our experience has been that the condition is seldom cured by the operation but the patient gets so much nasal relief that it is worth doing to boost his morale and also relieve any ear or sinus complications which may have been present.

We feel that radical surgery is contraindicated in most of these conditions. Many patients seem to be suffering from too much surgery rather than not enough.

*Electrocautery* has been used a great deal and seems to help in most cases. Submucous coagulation of the turbinates gives more air space and makes the patient more comfortable. Stroking the electric needle across the septum seems to give relief by cutting off certain sensitive nerve endings.

*Zinc ionization* has been advocated by Alden<sup>13</sup> and others. This seems to help to a limited extent. Some patients return year after year for this treatment for hay-fever. We have had poor results in the treatment of hay-fever but some good men advocate its use. Repeated treatments may be given about one week apart and the patient notes few after-effects.

We have used both the zinc sulphate-acacia jelly and the 1 or 2% solution. Personally we

prefer the jelly as it is more easily handled, does not disturb the patient as much and seems to get just as good results as the solution. We also used an electric machine attached to the office current but changed to an old battery set since the current from the latter was smoother and the sensitive nasal membranes were not irritated as much. A greyish-white covering of zinc is seen on the nasal membranes when the nose is blown clear. This gets thicker for a few days, then slowly disappears leaving the membranes redder and not nearly as sensitive as they formerly were. We generally give the patient 150 milliampère-minutes. We have noted that many people cannot take as strong a current as others. Some patients are more easily irritated than others.

*Phenol* is used a great deal and like ionization, gives good results in certain cases. Pure carbolic is applied to the nasal mucosa after spraying with cocaine. The results are somewhat like that of zinc ionization.

Other treatments appear from time to time but the results do not warrant mention. We have found that the simple procedure of blocking the nostril of the affected side with a piece of cotton will sometimes relieve a repeated or persistent unilateral headache and we have patients who have been using this method for years with very beneficial results.

#### SUMMARY

Vasomotor rhinitis is a localized nasal mucous membrane manifestation of a generalized nervous imbalance, possibly of endocrine origin primarily.

We feel that there is an increase in the amount of vasomotor rhinitis since the onset of the war due to worries, frustrations and disturbed home conditions found under war conditions.

Treatment is not specific and must be determined by the patient's mental state, glandular functioning and possible allergic tendency. While trying to determine the basic cause, some help must be given in the form of local treatment to the nasal mucous membranes. In the treatment one so often finds that "what is one man's food is another man's poison".

We feel that before the patient can hope to have any benefit from any treatment he must have complete "peace of mind". Mental tranquillity and happiness are absolutely necessary.

Many headaches that were considered sinusitis can be definitely considered as of vasomotor origin.

Far too much useless nasal surgery has been done on this type of case. We would like to emphasize the need for conservative treatment.

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Medical Arts Bldg.

## Case Reports

### ECTOPIC GESTATION FOLLOWING HYSTERO-SALPINGOGRAPHY

By M. Raymers, M.D.

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Mrs. S.O., white, aged 29, was seen by me on May 6, 1943. She had been married for eight years and had had an induced abortion eight years ago. She had been trying to become pregnant for the past five years.

Her menses began at the age of 16, appearing every 28 days and lasting three days. She was free from dysmenorrhœa, except for occasional backache, and her last menstrual period was on May 1.

Her chief complaint was sterility. For the past four years she had had some pain in the right lower abdomen, non-radiating, and stabbing in character.

Her past history showed nothing of note except the abortion already mentioned.

Examination showed the uterus to be normal in size and consistency, anteverted; mobility of the uterus was impaired on left side. Both tubes were palpable, but no obvious masses were felt. Cervix was infantile. Husband's sperms were active. Otherwise, findings were negative.

On June 3, 1943, five days after her last monthly period, the Rubin insufflation test was

performed, with negative results. Three days later, utero-salpingography was done. The right tube was opened in the process. Film taken in A.P. view after the injection of 5 c.c. of lipiodol showed the uterus filled with lipiodol. Both tubes were free of solution.

After injection of 7 c.c. the uterus was filled with lipiodol, the left tube was non-patent, the right tube was filled for the length of the proximal four cm.

After injection of 10 c.c. the left tube was still non-patent, the right tube showed up for six and a half cm.

Twenty-four hours later lipiodol was still visible in the right tube. A small blob of solution was seen loose in the peritoneal cavity, probably representing some spilling.

The impression was that the left tube was non-patent, the right tube was apparently opened during the test. It could not be definitely stated whether the right infundibulum was patent or not.

On July 6, 1943, exactly one month following utero-salpingography, I received a telephone call from a doctor, telling me that this patient had fainted at a downtown store and was diagnosed as a case of appendicitis. The patient refused to go to the hospital unless I so advised her. She came to my office the same afternoon. Her last menstrual period had been on May 28, six weeks previously; her breasts were sore; uterus slightly enlarged, and its mobility impaired; right tube felt thick and very tender. She gave a history of having had very sharp pain in the right side in the morning. I diagnosed ruptured right tubal pregnancy, and advised an immediate operation. The patient was willing to have an operation providing I would remove her appendix, but not her pregnancy. In spite of all my warnings she insisted that pregnancy was pregnancy regardless of the location, and one abortion eight years ago was enough for her. This time she was hanging on to the baby.

I left for my vacation three days later, and on my return was not surprised to learn that she was sent to the hospital by a different surgeon on July 12.

On admission her rectal temperature was 100, pulse 88, respiratory rate 20, her red cell count was 3,500,000, white cell count 11,500, Hgb. 80%. Sedimentation rate 15 mm. in an hour. Urine was negative for sugar and albumen,

acetone one plus, leucocytes 5-6 per high power field.

At operation under spinal anaesthesia, free blood and blood clots were found in the peritoneal cavity. A right tubal pregnancy was found and right salpingectomy was performed. The left tube was opened near the isthmus and a probe passed toward the uterus and the fimbriated ends. The appendix was removed.

*Pathological report.*—The Fallopian tube is tortuous and cylindrical. It is 7 cm. in length and 1 cm. in greatest diameter. A portion of the wall is torn and through this a sponge-like soft tissue is escaping. The fimbriae are not clearly seen. Adherent to the serosa at the distal end is a small thin-walled ovoid cyst. This contains a clear limpid fluid.

The appendix is cylindrical and kinked. It is 6.3 cm. in length and 6 cm. in greatest diameter. The external surface is light pink in colour and smooth except for a clamp mark at the base. The wall is of average thickness and consistency. The lumen is only partially patent to a probe.

*Microscopic description.*—In the sections of the Fallopian tube the lumen is filled with blood clot, chorionic villi and some decidua. No inflammatory cells are present in the wall of the tube. The small cyst at the distal end has a thin wall of fibrous tissue. It is lined by a single layer of cuboidal epithelial cells.

In the sections of the appendix the lumen is patent throughout and markedly narrowed. The mucosal epithelium is intact. No inflammatory cells are present in the mucosa, submucosa, muscularis and serosa. Final diagnosis: ruptured tubal pregnancy; para-ovarian cyst; appendix free from inflammatory changes; marked narrowing of the lumen of the appendix.

The patient returned to my office in November, 1943. She wanted to find out if her left reconstructed tube retained patency. Utero-salpingography was performed. Roentgenograms of uterus taken in A.P. view after the injection of lipiodol showed no dye in the tube. A picture taken 24 hours later showed the uterus free from the dye and there was no spilling of dye into the peritoneal cavity. The conclusion reached was that the tube was not patent.

#### DISCUSSION

In searching the literature I was able to find only one report of a case of extra-uterine gestation following hystero-salpingography. The

author of the report Dr. Polowe writing in *The American Journal of Surgery* in 1935, claims his article to contain the first published report of this kind. In other words, either the condition is very rare, or the gynaecologists have overlooked the possible connection between the two. This is surprising, because the literature contains quite a number of reports on cases of ectopic gestation following a Rubin insufflation test. Rubin himself estimates the frequency of such episodes as 1.5% in his series of cases, others, notably J. O. Polak and Mazer Huffman, give the frequency as 20% of successful pregnancies.

By hystero-salpingography we understand the roentgenographical visualization of uterus and Fallopian tubes made possible by injection of a suitable radiopaque substance. Introduced first by Rindfleisch in 1910, it has become a very important factor in the diagnosis and treatment of sterility, and promises to become an important aid in the diagnosis of bicornuate uterus, double uterus, as well as a multitude of various uterine malpositions, deviations and malformations. The general consensus is that in cases of sterility one should do a Rubin test and reserve the hystero-salpingography for those patients with non-patent tubes who have consented to be surgically relieved of the non-patency.

After many years of experience with both the Rubin test and hystero-salpingography I have come to rely more and more upon the direct visualization of the tubes and uterus. In cases giving a history suggestive of previous pelvic inflammation I often omit the insufflation test altogether, and thus spare the patient the unnecessary suffering and double risk attending both procedures; because there is no doubt that both the Rubin test and hystero-salpingography are attended by some danger. The possibility of infection of the tubes and peritoneum, and of rupture of the tubes and uterus, is present in both procedures. The danger of oil embolism caused by utero-venous influx in hystero-salpingography is balanced by the risk of air embolism in Rubin insufflation. The only risks specific to injection of radiopaque substance are those of retaining contrast materials for an indefinite period of time and of irritation to tubal mucosa. It has been argued that these two hazards make utero-salpingography unsuitable in the diagnosis and especially the treatment of sterility. In my opinion the possibility of irritation of mucosa



should make the gynecologist cautious of the type of substance used rather than of the procedure itself; and as to the retention of the radiopaque medium in the tube, it can only take place in a tube which is closed at the fimbriated end and which has lost its peristaltic and anti-peristaltic movements; in other words, a tube hopelessly destroyed by inflammatory changes and unsuited for the passage of the ovum in any case.

Robins and Shapira, of Boston, quote 32 cases of successful pregnancies following 133 utero-salpingographies, Greenhill 15 successful cases in seventy, Polowe 4 in 12 cases, Francillon-Lobre abstracted by Greenhill quotes 5 pregnancies in 27 cases in which insufflation was used, and 6 pregnancies after utero-salpingography was done on the 26 recalcitrant cases. In other words, the average percentage of pregnancies following utero-salpingography is 23.5% as against an average of 10% following Rubin insufflation.

#### SUMMARY

1. A case report is presented of ruptured ectopic pregnancy taking place four weeks after a hystero-salpingography.
2. Utero-salpingography is discussed with its complications.
3. A comparison of utero-salpingography and Rubin insufflation test is made.

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### MYELOGENOUS LEUKÆMIA AND PREGNANCY\*

(A Report of Two Cases)

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McGoldrick and Lapp<sup>1</sup> reported a case of myelogenous leukæmia and pregnancy. They quoted and analyzed all the reported cases. They state: "The coexistence of pregnancy and

leukæmia is rare. So far as is known there have been only two men who have themselves seen as many as 3 cases of leukæmia associated with pregnancy". No other physician has reported having seen 2 cases. They collected references to 111 cases in the literature and, of this number, they felt that in only 79 was a diagnosis of leukæmia sufficiently established. Of this 79, it was felt that 34 were of the acute type associated with pregnancy, as compared with 45 chronic cases. Of the 34 acute cases, only 17 were of the myelogenous type. Of the 45 chronic cases, 44 were of the myelogenous type. One hundred per cent maternal mortality was reported in the acute cases with 60% fetal deaths: 36.5% maternal mortality was reported in the chronic cases with a fetal mortality of 16.4%. They note that healthy twins were delivered on two occasions.

Our two cases are reported for the following reasons: both cases were seen on the radiological service at St. Boniface Hospital; both cases developed myelogenous leukæmia following earlier pregnancies; both cases survived and had living babies; one patient was followed through two pregnancies, twins being born at the first; in both cases pregnancies occurred after the institution of radiation therapy.

#### CASE 1

Mrs. P., a thirty-year old white female of Dutch descent, was first seen at St. Boniface Hospital on April 20, 1943. The entrance complaint at this time was that the patient had been passing black stools for three days. There was no evidence of fresh blood. She had had several severe nose-bleeds and had seen a physician on the previous day, who had her hospitalized and gave her two blood transfusions. When she was transferred to the staff the doctor found a large spleen and asked for a blood examination.

This patient was a gravida VIII, para VIII. The menstrual periods had been regular with some dysmenorrhœa. The physical examination showed a well-nourished female with the spleen extending two inches below the costal margin. The examination of the chest was negative. There were no glands palpable. The blood count was as follows: red blood cells 3,760,000; hæmoglobin 54%; reticulocytes 2.1%; white blood cells 102,400. Differential: neutrophils 60%; the balance was made up of mature myelocytes, eosinophils, and basophils. There were no myeloblasts; platelets 673,840.

X-ray therapy was instituted on April 29. The spleen was treated through an anterior and posterior port of 225 sq. cm. The shafts of the humeri, femora, and tibiae were treated anteriorly, using 200 sq. cm. ports. Factors: 140 K.V.P., ¼ mm. Cu, 1 mm. Al, 300 r measured in air to two ports daily. A total of 600 r was delivered to each area.

The patient was discharged on May 10, the white blood count being 22,500.

On April 18 the patient returned to the hospital. At this time she was six months' pregnant. The white blood count was 227,600. At this time she received a total of 1,500 r delivered to the spleen through an anterior and posterior port. She was discharged on April 25 the white blood count having dropped to 24,000.

\* From the Department of Radiology, St. Boniface Hospital, St. Boniface, Man.

The patient had a normal delivery on July 19. She returned to the hospital on October 11 when the white blood count was 202,000. She received the same amount of therapy to the same areas as the first course in April, 1943. The white blood cells had dropped to 35,000 by October 20, when she was discharged.

#### CASE 2

Mrs. deR., a thirty-year old white female of French-Canadian descent was first seen at St. Boniface Hospital on October 10, 1941. She was referred to the hospital by her attending doctor in the country with a diagnosis of myelogenous leukæmia. In October, 1940, the patient had given birth to her second child. During this pregnancy she felt perfectly well and the postpartum course was uneventful. In November, 1940, she had a severe hæmorrhage per vaginam which continued for three weeks and required complete bed rest. Following this, the patient stated she was always tired and felt quite weak. In May, 1941, she developed pneumonia and during the course of this illness the attending doctor noticed the large spleen and the associated anæmia was discovered.

On admission to the hospital the physical examination showed enlargement of the spleen to the umbilicus medially and to the anterior superior spine inferiorly. There was definite enlargement of the posterior cervical glands on the left side with a lesser enlargement of these glands on the right. The blood count was: red cells 3,540,000; hæmoglobin 60%; leucocytes 260,000; reticulocytes 2%. Differential: neutrophils 65%; the balance was made up of mature myelocytes, eosinophils, and basophils; platelets 625,000.

Radiation therapy was instituted on October 11, 1941. The spleen was treated through an anterior and posterior port of 225 sq. cm. The shafts of the humeri, femora, and tibiae were treated anteriorly, using a 200 sq. cm. port. Factors: 140 K.V.P.,  $\frac{1}{4}$  mm. Cu, 1 mm. Al, 300 r measured in air to two ports daily. A total of 600 r was delivered to each area.

At the end of ten days the white blood count had dropped to 38,650 and a week later the count had dropped to 18,150.

The patient was next seen on July 17, 1942. In the meantime she had become pregnant. The conception must have occurred very soon after the completion of the radiation treatments. In June she had been delivered of twins about one month premature. The delivery was attended with considerable bleeding. The white blood count at this time was 380,000. The spleen was slightly larger than at the original examination in October, 1941. The cervical glands were again palpable and glands were also palpable in the popliteal fossæ. The treatment as of October, 1941, was repeated, with the exception that 900 r were delivered to each area and the treatment was discontinued on July 30, 1942. The white blood count had dropped to 40,000. On August 25, 1942, the white blood count was 10,250.

On January 5, 1943, this patient again returned and was at this time three months' pregnant. She was feeling very poorly. The white blood count was 146,000. The same treatment was again instituted and the white blood count dropped to 16,000.

On July 23 the patient was delivered of a full-term child. There was considerable hæmorrhage after delivery but the patient's general condition was better than after the preceding pregnancy. On August 30 the patient returned. The white blood count was 128,000 and she complained of being very tired. Treatment was again instituted and 900 r were delivered to each port. The white blood count dropped to 21,200.

On February 5, 1944, the patient again returned and the white blood count at this time was 326,400. The same areas were treated again but 1,200 r were delivered to each port. The white blood count dropped to 27,250.

In April, 1944, various joints suddenly became red and hot, especially the wrists. Pain migrated from joint to joint, and was so severe that the patient was unable to leave her bed for ten days. The swelling and pain disappeared as quickly as they came. In August,

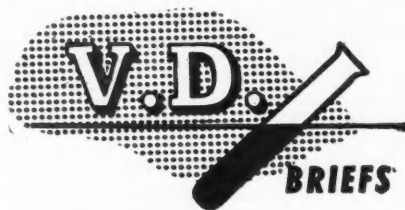
1944, she had a similar attack, which ran much the same course.

On September 9 the patient returned and this time the white blood count was 416,000; 1,200 r were given to the same ports and the white blood count dropped to 31,400. This patient presented another interesting factor in that any trauma resulted in marked bruising and swelling which resolved very slowly. Small cuts usually bled for a long time.

#### REFERENCE

1. MCGOLDRICK, J. L. AND LAPP, W. A.: *Am. J. Obst. & Gyn.*, 46: 711, 1943.

## Venereal Disease Campaign



### "A Baneful Practice"

From a committee report, House of Delegates, American Medical Association, June 8, 1942, referring to the issuance of "certificates" of freedom from V.D. to prostitutes:

"This is a baneful practice which encourages the maintenance of vice and may do incalculable damage by giving false assurance of safety and lead to an appreciable increase in venereal disease."

### When is the Patient Cured?

"A small percentage of both male and female patients harbour the gonococcus for some weeks after symptoms have disappeared. In the absence of cultural studies, all patients should be regarded as potentially infectious for a period of three months after all symptom disappear. If such patients have sexual intercourse during this period, a condom should be used to protect the partner. Cultural studies are of great value in the recognition of carriers and offer the most dependable criteria of cure.

"As scientific evidence of cure four consecutive negative cultures taken at intervals of 2 weeks may be accepted. In women one such culture should be taken immediately after menstruation. The first of these cultures should be taken a week after apparent clinical cure is affected. In addition to yielding negative cultures, the patient should show no clinical evidence of gonococcal infection before 'cure' can be pronounced. Even after 3 months of such 'established cures', recurrence may be found, but this is rare."—"Venereal Disease Information", May, 1943.

### "Find V.D. Contacts — Report V.D. Cases"



## Editorials

### THE RETURN OF THE WAR VETERAN TO INDUSTRY

WHILE large numbers of returning soldiers will readjust themselves to industrial life unaided, there is general agreement that their return should not be left to chance. Attention has been drawn to the changed conditions which the war veteran will encounter, bearing on the significance of front line combat in relation to his industrial job; his life away from home; his lack of responsibility for food, clothing, and medical care; and his training to work closely with others as a unit rather than individual effort.

Rehabilitation must take account of home and social adjustments as well as job placement. The Federal Government requires the employer to re-employ within certain limitations all ex-service men who at the time of enlistment were employed by them. It provides guidance in the availability of different types of work, and how suitable these jobs are to the individual. However, experience after the last war, and with employees subject to Workmen's Compensation benefit since then, emphasizes the need for personal service in placement and follow-up, either by those charged with this responsibility working from a central agency, or preferably by those working from within the individual factory organization. With no undue solicitude, and with a view to helping the veteran to help himself, it is important that he be properly introduced to his working environment, given the opportunity to indicate his preference, and provided with work he is physically and mentally able to do in competition with others if he is to have any lasting satisfaction. In many cases there will be a period of some weeks for adjustment to any type of industrial work, and it is in the original placement and during this early period in the factory when the physician has most to contribute.

During the war period industry has been served largely by young and old and handicapped workers. After the war at least 50% of industrial workers will have served in the armed forces and one-half of these

will be entering industry for the first time. The disabilities for which many of them are discharged, while important for military service are of no significance in industrial work. However, discrimination is necessary to identify and help those who are handicapped, utilizing what abilities remain without stressing the deficiencies.

The adequate placement of employees involves a knowledge of physical condition which only the physician can obtain. It may be noted that disabilities encountered in war veterans are more frequently those common to the adult population than those due to combat. The recital of detailed history under these conditions, including reasons for discharge, length of service, combat experience and service training, may be important in guiding the employee to a new perspective or in revealing traits which render him unsuitable for particular kinds of work. Obviously, this is incomplete without a detailed knowledge of what the job requires whether in temperament or in physical and mental capacity. More than the usual office consultation is necessary.

In large factories the employment manager and directors of personnel, safety and education have conducted job analyses and set up specifications to be met in placement. The industrial physician is usually available to assist in giving effect to these specifications and he may find himself at times entirely responsible for recommending placement. In small factories where the aggregate number of persons employed is much larger and where neither medical nor employment personnel are available, the procedure is much more likely to be haphazard. The family physician will be consulted by the veteran who is having difficulty in adapting himself to factory life, and by the employer who feels the need for medical advice in his effort to meet his employment obligations. Long lists of job specifications necessary for large plants need not deter the physician. Their place is taken for the individual case by a short study of the job as he sees it carried out on a visit to the factory. This is necessary if the intention of the "Reinstatement in Civil Employment Act" is to be realized. This service can contribute



much to those who so richly deserve the benefits of the intelligent and sympathetic use of available information on placement. It can also bring new understanding between employers, employees and physicians.

At least as important as the veteran's introduction to industry is his maintenance at his work, or his transfer to other work, if this becomes necessary. The foreman's attitude is the determining factor in this situation. He is the contact between facilities provided and the workman. He should be the physician's ally especially in the small factory. Continuing health supervision is necessary. It is best supplied by industrial health services established by employers in factories of any size. Such follow-up is essential and can be done with understanding only from within the factory. Industrial Hygiene Divisions in the Dominion or Provincial Departments of Health, and Canadian or Provincial Medical Associations, will supply the details for establishing such services.

To assist members of the medical profession to keep themselves informed on this subject, abstracts of appropriate articles from the extensive literature on the subject of rehabilitation of war veterans in industry will appear in the Industrial Medical Section of the *Journal*.

J. G. C.

### A REHABILITATION CENTRE

"AFTER a debilitating illness or injury, even when restoration to full functioning capacity is envisaged and will be attained, there is a period between the cessation of active treatment and full employment during which working efficiency remains impaired and accident proneness is increased."\*

The Rehabilitation Centre at Egham (near London) has been created by the Ministry of Labour to bridge this interval between convalescence and return to work. In a sense it is a hardening process that is applied but in the case of the injured man who cannot return to his former job, it serves also as a beginning of vocational readjustment.

\*"An Industrial Rehabilitation Centre," F. D. Howitt, *British Medical Journal*, 2: 52, July 8, 1944.

It is obvious that a rehabilitating process of this nature is dependent on staff and equipment, but more particularly on staff. A manager or superintendent is needed who is skilled in the requirements of trade and industry, who is sympathetic in his attitude towards the incapacitated man and who possesses at least an intuitive knowledge of psychology, for men undergoing rehabilitation involving a change in their vocation have a mental hurdle to surmount as well as a physical one, and often the mental aspect is more difficult to deal with than the physical.

A physician is also needed, but the skill of the ordinary physician is usually not sufficient in a problem like this. The physician should have an understanding of the practical problems of rehabilitation on the medical side, and also a knowledge of industrial requirements, so that he can be in a position to judge whether a given occupation can be undertaken by an individual under his care.

Other persons besides the manager and physician are needed as well, such as a physical training expert, a physiotherapist, perhaps an occupational therapist, and various craftsmen capable of teaching and assessing the capacity of the men to learn different trades.

The equipment required is based on the premise that the process of rehabilitation can best be carried on in a residential setting and this implies proper feeding and housing accommodation, and in addition, a gymnasium, physiotherapeutic apparatus, various types of work shops, and provision for outside occupations such as gardening and the like. This is the set-up at Egham, and is designed to serve men who have suffered from war injuries, industrial accidents and certain non-traumatic disabilities (tuberculosis, heart disease, rheumatism, etc.) The duration of the course at Egham is from 6 to 8 weeks, and during the time that the men are there they receive, in addition to their maintenance, a small compensation for themselves and their families. It is realized that this time is quite inadequate to re-train an individual, but it is thought to be sufficient, first to provide a period of physical hardening, and second, to enable a man to decide, in consultation with the

staff, the occupation which will fit in the best with his inclinations and capacity. Actual re-training which may involve a long period of time, is arranged for elsewhere.

There have been many experiments in rehabilitation and the centre at Egham is one of the most recent. It is based on the belief that rehabilitation is not a cheap and easy process. It requires skill, patience and proper equipment. The results at Egham should be watched by those interested in the problem.

F.G.P.

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## Editorial Comments

### Medical Service Plans in British Columbia

We commend to our readers' especial attention the following report on the growth of medical service plans in British Columbia. These plans are, of course, an expression of the attempt to lessen the burden of medical care. The fact that they are showing such astonishing growth is only another proof of the widespread desire to deal with medical economic problems. To that extent they must be recognized. But this excellent report from British Columbia shows very clearly the dangers that accompany these developments. The first and most obvious is that of exploitation. Where the plan is run as a non-profit scheme with complete medical and surgical coverage, adequate contributions and low overhead, it is desirable, especially if it works in close co-operation with organized medicine. But these conditions are lacking from many of the plans named in this report, and the very proper recommendation is made that all such medical contracts should be under Government supervision.

Opinions differ as to the eventual place of medical service plans in solving all medical economic difficulties, but in any case, there is urgent need to regulate these schemes.

This study emphasizes the importance of the subject besides adding some valuable recommendations from the point of view of organized medicine.

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The establishment of a system which provides low grade medical care will have the same effect in reducing the amount of care of a better grade as has cheap money in driving sound money out of circulation in the monetary system. In commerce and in medicine, if standards of living are to be maintained, quality of output must also be maintained. Reduction of quality lowers standards of living.—E. E. Irons, *J. Am. M. Ass.*, 127: 623, 1945.

## Medical Economics

### MEDICAL SERVICE PLANS IN BRITISH COLUMBIA

*Prepared by the Committee on Economics of  
the College of Physicians and Surgeons  
of British Columbia*

Organized medicine in British Columbia placed itself on record before the Hearing Committee in 1935 as favouring some plan of contributory health insurance which would be fair to all concerned and preserve adequate standards of service and remuneration.

About this time the British Columbia Telephone Company Employees Association approached the profession to give service to their members, observing two fundamentals in medical practice, *i.e.*, (1) free choice of doctor, and, (2) remuneration on the basis of the schedule of fees of the College of Physicians and Surgeons. The profession accepted the plan, agreeing to grant a discount of 25% off bills for procedures as listed in the fee schedule. This was a group of employees of one company—funds being provided by deductions from payroll—with very little cost of administration.

Compulsory health insurance was in the offing in British Columbia at that time and this appeared to be somewhat of an alternative. Besides it was during the depression years and in consequence looked like a fair bargain. This plan has continued to operate ever since. It is fairly satisfactory and has remained solvent. The amount of assessment of its members has been raised considerably since the inception of the plan. It provides both hospital and medical services. Since that time other plans have been accepted by the profession and these are now in operation: Vancouver School Teachers and Teachers Provincial Federation; British Columbia Electric Office Employees plan, and Cunningham-Western Drugs. Also West Kootenay Power and Light at Nelson. There are some minor differences in these plans but they all operate under the principles of free choice of doctor and bills are paid according to an agreed percentage off our provincial fee schedule.

About two years ago Yarrows Employees of Victoria started a plan which was strictly confined to Victoria. On account of its local character, and the fact that it had been approved by the Victoria Medical Association, the plans received the O.K. of the Committee on Economics of the College and the Council of the College of Physicians and Surgeons, even though it was felt that contributions to the fund were considered to be rather low. That scheme has become insolvent, owing a considerable amount to the doctors of Victoria.

A large number of smaller groups of employees inquired regarding the development of

**COMPARISON OF SICKNESS AND ACCIDENT CONTRACTS IN BRITISH COLUMBIA  
PROVIDING FOR MEDICAL AND SURGICAL CARE**

	<i>Service Contracts</i>		<i>Indemnity Contracts</i>		
	M.S.A. Telephone Teachers B.C.E.R. Cunningham's West Kootenay	Travelers Aetna Metropolitan Zurich London Life Mutual Life Confederation Great West	North Pacific Employees' Mutual Industrial Health National Health Union Premier Reliance Citizens Fraser Valley	Mutual Benefit Health and Accident Associ- ation, Nebraska. Registered under the Insurance Act	
	<i>A</i> M.S.A.	<i>B</i> Standard	<i>C</i> One type	<i>D</i> Another type	<i>E</i> M.B.H. & A.A.
1. Payment.....	Obligation is to doctor	Obligation is to pay insured person.			
2. Preventive service...	Yes	No	No	No	No
3. Medical service.....	Yes	No	Rider may be added providing for 2 calls a week after the first week's disability up to \$30 at rate of \$2.50 and \$3.00 for office and home visits.		No (If monthly indemnity not claimed, some policies will re-imburse employee up to \$25 for accident)
4. Surgical.....	Yes	Schedule \$5 - \$150	Schedule \$10 - \$150	Schedule of C. of P. & S. up to \$250	Schedule for injuries
5. Maternity and waiting period.....	Yes 9 months	Yes 9 months	Yes 24 months	Yes 24 months	....
6. Enrol individuals...	No	No	Yes	Yes	Yes
7. Enrol groups.....	Yes	Yes	The management of few companies will have anything to do with them.		Not in British Columbia yet
8. Underwriting requirements for groups...	A minimum of 10 or 75% of group, whichever is greater	A minimum of 25 or 75% of group, whichever is greater	No percentage required. The only difference seems to be in respect to the registration fee which may be from \$1.50 - \$7.50 depending on the number in the group enrolled.		
9. Family care included if desired.....	Yes	Yes	Yes	Yes	No
10. Income limit.....	Not more than 10% of a group may be in the higher income brackets. In small groups the exclusion would be by occupation; for example, executives would be excluded in Master Application	No	No	No	No
11. Maximum liability..	One year for one illness or accident	Employee—none Dependents—\$450.00	\$800.00 one family		Limited to the amount of monthly indemnity
12. Waiting period:					
Sickness.....	None	None	90 days	90 days	....
Accident.....	None	None	None	None	None



	A M.S.A.	B Standard	C One type	D Another type	E M.B.H. & A.A.
13. Excluded:					
(a) Refractions . . . . .	Yes	Yes	Yes	Yes	
(b) Public health services . . . . .	Yes	No	Yes	Yes	
(c) Pre-existing conditions . . . . .	No	No	Yes	Yes	
(d) Hernia or tumours	No	No	Under 24 months		
(e) Appendectomy . . .	No	No	Under 6 months		
(f) Tonsillectomy and adenoidectomy . .	No	No	Under 12 months and one per family a yr.		
(g) Prostatic male conditions and menopausal female conditions . . . . .	No	No	Under 24 months		
(h) Congenital defects	No	No	Yes	Yes	
(i) Alcoholism, drug addictions, cosmetic effect, V.D., mental diseases . .	No	No	Yes	Yes	
			(In selling groups (c) to (h) will sometimes be waived according to promise of agents).		
14. Resources . . . . .	Underwritten by doctors of British Columbia	Deposit with Government	No deposit and need not have one cent in Treasury in order to sell membership		Deposit with Government
15. Supervision . . . . .	Supervised by Committee on Economics of Council of College	Supervised by Dominion and Provincial Insurance Departments	No supervision		Supervised by Dominion and Provincial Insurance Departments
16. Operated for gain . . .	No	Yes	Featured as non-profit, but it is hard to find a non-profit motive.		
17. Agents on Commission . . . . .	No	Yes	Yes, agent receives registration fee		Yes
18. Agents supervised . . .	No agents employed	Agents are licensed. License may be revoked for misrepresentation	Agents not licensed and no redress for misrepresentation		Agents are licensed. License may be revoked for misrepresentation
19. How claims handled.	By doctor acceptable to Council of College	By trained adjusters on salary	By laymen who only have what knowledge they may pick up		By adjuster
20. Administrative expense . . . . .	10%	It is not known what the cost is for handling groups here. Commission to salesman is far less than for individual policies	From 20 - 50%		
21. Disclosure of confidential information.	Each signed application contains authorization for disclosure	Claim forms are completed by doctor on request of insured	Claim forms are sometimes sent directly to doctor and it is doubtful if he always has authority to disclose information to a third party		Claim forms are completed by doctor on request of insured
22. Extension of credit by doctor . . . . .	Yes	No	Continued dealings directly with these people would give the public this impression and render difficult collection in case of failure		No
23. Free choice of doctor	Yes	Yes	Restricted in practice to those doctors who will deal with them		Yes
24. Interference between doctor and patient . .	No	No	Method of operation and absence of prior arrangement with College leads to interference, particularly with Type D		No, except through claim practice*

\*In order to claim full indemnity requires confinement within doors. In order to claim any indemnity requires visit of physician once a week.

plans similar to that of the British Columbia Telephone Employees, but we felt that it was not practicable unless the group membership was fairly large and the solvency of its funds could be maintained. To meet this demand the Medical Services Association was brought into being and has proved a boon to these groups in that they are permitted to join co-operatively and enjoy all the privileges of the larger groups.

One hundred and fifty groups of employees are now enrolled with the Medical Services Association with a total membership of over 18,000, and it is growing rapidly, having spread pretty widely over the Province. The Medical Services Association is popular not only with the member groups but with the profession too. The Board of Directors has two employee members and one each from the employers and doctors. In many instances the employer contributes part of the assessments. The M.S.A. is now providing medical services only, but works very closely with the Blue Cross Hospital plans (Associated Hospitals Services of British Columbia).

The above plans are the only ones that have been approved by the Committee on Economics of the College of Physicians and Surgeons and the Council. Several other plans have been submitted which we did not approve of, largely because we felt that the amount of contribution of members was not sufficient to maintain solvency. To clarify the situation, so far as the profession was concerned, a letter was formulated by the Committee on Economics of the College which received the O.K. of the Council and was mailed to every practising physician of the Province over the signature of the Registrar.

Copy of this letter is herewith presented:

ANNOUNCEMENT REGARDING MEDICAL SERVICE PLANS  
IN BRITISH COLUMBIA

To all Members of the College of Physicians and Surgeons of British Columbia:

Having accepted the principle of providing medical services on a pre-payment basis, the Council and the Committee on Economics of the College of Physicians and Surgeons feel that the profession should be informed of the principles which form the basis of consideration of medical service plans which have been submitted for approval.

Various plans developed for employees have been presented. In reviewing and making recommendations with regard to these plans the Committee on Economics of the College has attempted to assure itself that such associations comply in large measure with the following conditions:

1. That they are operated on a non-profit basis;
2. That they provide the fullest service possible;
3. That they are free from annoying restrictions and limitations;
4. That they are financially sound;
5. That where privileges are extended to associations the membership will largely fall within the low-income group level;
6. That the promotional and administrative costs are at a low level;
7. That the right of free choice of doctor shall be observed;
8. That remuneration shall be based on the schedule of fees of the College of Physicians and Surgeons of British Columbia;

9. That funds be protected and expended for the provision of medical benefits.
10. That the interest of the member is protected.
11. That patient-physician relationships be preserved as in private practice.

The following non-profit plans operating for employees, who have formed their own associations, have been approved, and remuneration is paid directly to doctors and accepted on the basis of the Schedule of Fees with discounts as arranged by the Committee on Economics of the College with the associations. These plans have all been accepted by district associations where members render the service:

Medical Services Association.  
Telephone Employees' Sick Benefit.  
B.C.E.R. Co. Office Employees.  
B.C. School Teachers' Med. Serv. Assn.  
Vancouver School Teachers.  
Cunningham-Western Drug.  
Yarrow's Employees Health Assn.  
West Kootenay Power & Light.

Some of these associations already employ a director of medical services, who has been approved by the Council of the College of Physicians and Surgeons. This policy is recommended.

Other associations which have been formed and operate in the same manner as insurance companies selling benefits, which are largely limited to hospitalization and surgical operations on a reimbursement basis, have sought endorsement by the Committee on Economics of the College. This Committee does not recommend that an extension of credit should be given to these associations, or that a doctor deal directly with them with regard to services rendered his patient. The same conditions should exist as in private practice where the doctor renders his bill on the basis of the schedule of fees of the College of Physicians and Surgeons of British Columbia.

Since that time, owing to our very satisfactory experience with the M.S.A. the Committee on Economics of the College has gone on record as not approving any plan in the future that does not come up to the standards of the Medical Services Association.

With the advent of the M.S.A. and its successful development, also the desire on the part of the public for some prepaid medical plan to distribute the cost of illness, private schemes have come into being. In the accompanying analysis entitled, "Comparison of sickness and accident contracts providing for medical and surgical care", you will note that nine of these private associations are listed under indemnity contracts. Regular insurance companies' group insurance contracts are not here included. These private association contracts have not been approved by the Committee on Economics of the College and there is no agreement with us whatever regarding discount off our schedule of fees or arrangement regarding supervision. The M.S.A. has a medical director approved by the Council and the Committee on Economics of the College. With the B.C. Teachers, B.C. Electric, B.C. Telephone and other plans approved by the profession, a committee appointed by the Committee on Economics acts in an advisory capacity in adjusting medical bills, etc.

Some of these private associations are classing themselves as non-profit since the issuance of our letter to the profession, February, 1944, but it

is difficult to understand this claim. They solicit both group and individual contracts through agents who receive substantial commissions and their overhead is much higher than the M.S.A. which has an administration cost of less than 10%. These private associations also have many exclusions which often are an excuse for not paying claims. The M.S.A. on the contrary has no exclusions; it gives a full coverage, medical, surgical and obstetrical. The private schemes give surgical, obstetrical (after 24 months) and a limited medical service (maximum \$30.00). One can readily see the advantage of the M.S.A. over these other contracts. It gives a full service, both medical and surgical, no exclusions, low overhead, no commissions, and works in close contact with organized medicine at all times. Its services are entirely medical since hospitalization has been removed. All monies received, less low administrative cost, are available for the payment of medical bills.

The ease with which some of these private organizations can be formed has given the Government some worry. They are registered under the Societies Act of the Province and as soon as a charter is granted can begin to operate. They need not have a dollar in the treasury when they begin business, so the Government has appointed a Royal Commission to investigate the operation of all schemes giving medical and hospital benefits with the object of regulating them by statute. That commission is now sitting, but it will be some time before it can complete its hearings and submit its report to the Government. We are hoping that eventually all these plans will come under the regulations of the Insurance Act of the Province with some special supervision as to their operation.

One more point regarding the M.S.A. should be mentioned. Giving as it does, complete medical service, both in and out of hospital, and working in close co-operation with organized medicine, valuable statistics will be obtainable regarding the cost of medical care. Are surgical fees too high in proportion to other medical services? The opportunity here offered for a study of this sort should be more than valuable in revising our scale of fees. Even in a very superficial survey of the operation of a plan in which a considerable discount is taken off medical bills, one can see that a disproportion now exists between surgical procedures and other medical services, particularly in the smaller items such as house calls and office visits, and we can also list with the latter obstetrical fees. In the future, in the formulation of fee schedules account must be taken of the value of any given procedure in respect to a complete medical service in which all branches of medicine are represented. What is the value of each in providing health to the community? What is the value of each in the successful operation of a medical service plan?

We in British Columbia who are faced with many and varied plans offering medical services, feel the need of actuarial advice of the highest order to give us sound guidance in many problems which we have to solve in respect to these plans; how to better those we have already approved of and discourage others which we feel are unsound and will not give good service. In this we are fortunate in having a man of the calibre of Mr. Wolfenden to give us his sound advice.

Some conclusions:

1. Medical service plans or voluntary health insurance schemes as they are sometimes called, are here on our doorstep and are here to stay until replaced by some larger scheme-like compulsory health insurance. There is a large public demand for them.
2. Non-profit plans with adequate contribution to the fund and low overhead cost and giving a complete medical and surgical service with no restrictions are the most desirable, particularly when they work in close co-operation with organized medicine.
3. Fee schedules should be reviewed with the object of proper balancing of listed procedures in respect to their value in a comprehensive health service.
4. All organizations offering medical contracts should be properly regulated by statute under Government supervision.
5. Organized medicine must have sound actuarial advice in solving its problems with voluntary insurance plans.

### THE EFFECT OF HEALTH INSURANCE ON THE DEMAND FOR HEALTH SERVICES (In Abstract)

By L. Richter, J.D., Sc.Pol.D.

To clarify some of the problems which will arise under health insurance when the public will be able to call for such services as they may need (or think they need) the Institute of Public Affairs at Dalhousie University studied two Nova Scotia communities:

1. Glace Bay, a coal mining town of 13,536 persons, which for all practical purposes has had compulsory health insurance for more than 80 years.
2. Yarmouth, a non-industrial town of 7,492 which receives its medical care under the usual fee-for-service basis.

The survey was conducted for twelve consecutive months between December 1, 1937, and July 1, 1939. All illnesses of every type receiving medical attention were tabulated. The author, Dr. Richter, indicates the adjustments which were deemed necessary to equalize variables in the two situations.



The article gives numerous instructive tables and graphs of the data collected. Both these and the author's interpretations are interesting and easily read. As a source of useful and instructive information on statistical data, the article should form a part of every one's library who is interested in the problem of prepayment for medical services. The conclusions reached are worth repeating. They are as follows:

1. Health insurance is likely to bring about a considerable rise in the demand for health services. The rate of increase will to some extent depend upon the previous level of demand in the population. An increase of 55% as found in the survey may be regarded as indicative of the general trend in Eastern Canada if the two communities surveyed are deemed to be representative. The increase might be greater in areas with unfavourable health conditions or among vocational groups which are exposed to special risks. The insured population of Glace Bay, including underground miners, had 75% more doctors' calls than the uninsured groups in Yarmouth.

2. A demand level as indicated by the survey appears to be a permanent feature of health insurance as the insurance scheme surveyed in Glace Bay had been in operation for about eighty years.

3. Health insurance appears to be most beneficial for large families and for children. It is borne out by the survey that under the present-day system of medical care children between 5 and 15 years receive only about one-third of the medical care which children of the same age enjoy under health insurance.

4. There appears to be need for making available to the population under health insurance not only care by the general practitioner but also the services of specialists whenever they seem indicated, according to the state of medical science. Only illnesses which required specialist treatment were found in the survey to have received more medical attention under the present-day system than under insurance.

5. Health insurance seems to bring about an excessive demand for drugs if they are obtainable without cost to the patient. An annual rate of more than three drugs per person in the survey group was found to exist under insurance.

There is one aspect of the problem not covered by the report, *viz.*, the quality of service rendered under the two opposing systems. This, of course, is difficult to estimate even for a well-trained and experienced physician, and Dr. Richter and his collaborators, very wisely, simply state the facilities available and leave consideration of this factor to the reader's own judgment.

It is this point of juncture which gives rise to difficulty in approaching this problem. There is a tendency for both lay and professional groups to avoid this issue and the point of efficient and economical utilization of equipment and personnel. It would appear that

this is a responsibility of the medical profession which will require a fearless and honest appraisal of these factors, on their part, before mutual understanding between the profession and laity can possibly be reached. The laity has through numerous studies such as Dr. Richter's made available their findings. The profession on their part have been content to talk in terms of vague generalities and, insofar as we are aware, have not produced evidence based on factual data. It is this hiatus which needs to be filled before health insurance can be satisfactorily operated.

If the profession would apply the same diligence and intelligent understanding to health insurance as they do to the problems of actual medical care, a solution could be reached. Without it, any plan of Health Insurance is doomed to years of hardship and misunderstanding with deleterious effect to all.

Dr. Richter's article is worthy of careful consideration because of what is set forth as well as throwing into sharp relief the problems awaiting solution by the profession. There are a number of organizations other than Glace Bay in operation throughout Canada. A thorough evaluation of their experience would help materially to fill the gaps apparent from the professional side since most of them have had of necessity to consider those points which cannot be understood or made apparent in studies such as done by Dr. Richter.

This abstract has been prepared by Dr. J. A. Hannah, Toronto, and is taken from the *Canadian Journal of Economics and Political Science*, 2: 179, 1944.

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## Divisions of the Association

### Saskatchewan

The Saskatchewan Medical Convention will be held at the Hotel Saskatchewan in Regina, the tentative dates being September 20, 21 and 22. Regina and Moose Jaw doctors will act as joint hosts.

H. D. HART

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Social legislation can be harmful when it is based on wishful thinking rather than on a thorough knowledge of the ends sought and of the workable means for obtaining them. Ignorance of what besides the desired end is involved in the proposed change is truly the greatest enemy of social progress; far more so than the most reactionary forces that actively oppose social progress.—Report of Committee on Medicine and the Changing Order, January, 1945.

## Medical Societies

### A Canadian Infantry Division Medical Society

A meeting of a Canadian Infantry Division Medical Society was held at a Canadian Field Ambulance in northwest Europe on January 17, 1945, and was one of the most interesting and best attended meetings so far held. The President, Lieut.-Col. C. U. Letourneau, O.C. a Canadian Field Ambulance, was in the chair, and introduced the speakers as well as several new members of the Society, including Lieut.-Col. T. C. Gibson, O.C. a Canadian Field Ambulance, and Major W. R. I. Slack, O.C. a Canadian Field Dressing Station.

Major W. Moffat, R.C.A.M.C., O.C. an Advanced Depot of Medical Stores, spoke of the supply of medical equipment in forward areas, and the problems that had to be dealt with in this theatre of operations. He dealt with articles that were in short supply, and urged that economy in their use be observed. Major Moffat kindly invited medical officers to visit the Depot.

The next speaker was Captain A. Gould whose discussion of penicillin was most interesting. He dealt with the discovery, preparation, and use of this drug, and his address evoked considerable discussion and many questions, since few regimental officers have had the opportunity of observing the employment of penicillin.

Captain Mulvihill spoke briefly of a clinical session on diphtheria that he had attended at a Canadian Casualty Clearing Station. The diagnosis, treatment, and convalescent treatment of these cases was touched on.

Major E. Wolstein, an eye consultant attached to a C.C.S. in this area, was a guest at the meeting. He spoke briefly of eye problems in forward areas with particular reference to night blindness, burns, and perforating wounds of the eye.

Colonel S. G. U. Shier, A.D.M.S., addressed the meeting and welcomed the guests from other formations. After adjournment refreshments were served by the Field Ambulance.

MAJOR R. B. MURRAY, D.A.D.M.S.,  
*Cdn. Inf. Division, Sec.-Treas.*

### Saint John Medical Society

The Saint John Medical Society notified the two general hospitals in Saint John of their insistence that no patient be admitted to their hospital under the Blue Cross plan unless these patients had previously engaged their own medical attendant. This notice was considered necessary due to the fact that some persons enrolled under the Blue Cross have the erroneous idea that physicians' fees are included with hospital coverage. When such patients are so admitted without arranging for their medical attention

the situation becomes embarrassing for the doctor on hospital public service, as well as placing an extra burden on the attending physician on public ward service.

### La société médicale des hôpitaux universitaires de Québec

Une séance de cette société eut lieu à la Clinique Roy-Rousseau, le 2 février dernier. Ainsi que les résumés des travaux qui y furent présentés.

#### TORTICOLIS SPASMODIQUE: UN CAS SOUMIS À L'ÉLECTRO-CHOC.—S. Caron et C. A. Martin.

On présente une jeune fille atteinte de torticolis spasmodique avec troubles neurologiques extra-pyramidaux associés et anomalies mentales. On fait la critique des interprétations fonctionnaliste et organiciste en faveur de celle-ci et l'évaluation des procédés thérapeutiques. Seule l'électroplexie a réussi à modifier partiellement le torticolis.

#### NÉOPLASIES CÉRÉBRALES MÉTASTATIQUES SANS MODIFICATION DU LIQUIDE CÉPHALO-RACHIDIEN-EPILEPSIE.—L. La Rue et L. Patry.

Observation d'une malade porteuse de nombreuses tumeurs cérébrales métastatiques, chez qui il n'y a eu aucun signe neurologique de localisation, ni aucune modification du liquide céphalo-rachidien. Les constatations faites à l'autopsie sont venues confirmer les travaux faits sur cette question tendant tous à démontrer que les tumeurs cérébrales de cet ordre ont une symptomatologie particulière et que souvent elles évoluent sous le masque d'une cachexie inexpliquée.

#### EMPOISONNEMENTS MORTELS PAR LE SALICYLATE DE MÉTHYLE.—G. Desrochers.

L'auteur rapporte deux cas d'empoisonnement mortel par le salicylate de méthyle, avec autopsie. La substance toxique fut ingérée sous forme d'une essence, dite "thé des bois", mélangée d'une liqueur douce. La mort se produisit après trente-six heures environ.

L'autopsie révéla principalement des lésions congestives de tous les viscères, un œdème pulmonaire intense, des ecchymoses sous-péri-cardiaques et de la dégénérescence graisseuse du foie et des reins. L'analyse toxicologique montra la présence de salicylate de méthyle en abondance dans le sang et les viscères.

#### SERVICE SOCIAL PSYCHIATRIQUE.—J.-C. Miller.

##### LA JEMMERAIS

Le Service Social Psychiatrique constitue un auxiliaire à la prévention, au diagnostic et au traitement des malades mentaux; il facilite les mises en congé et consolide des résultats obtenus. Au près des infirmes mentaux, des prédisposés, des épileptiques, etc., on en tire également de grands avantages. Sous l'impulsion de l'école du Service Social de Laval, un projet de réorganisation de nos facilités cliniques déjà existantes est à l'étude, afin de mieux utiliser un personnel déjà préparé et d'étendre ces services à toutes les institutions psychiatriques du District de Québec, ainsi qu'aux différents milieux susceptibles de profiter du Dépistage et de la Sélection psychologique.

#### ATAXIE FRONTALE.—S. Caron et C.-A. Martin.

A l'occasion d'une intervention neuro-chirurgicale faite par le docteur Jean Sirois pour un gliome cérébral localisé au pôle antéro-inférieur du lobe frontal gauche, ces deux médecins ont signalé que l'ataxie frontale se différencie très bien de l'ataxie tabétique cérébelleuse labyrinthique et celle des scléroses médullaires. C'est une ataxie tronculaire et non segmentaire qui ne s'accompagne pas des



signes de la série cerebelleuse: asynergie, dysimétrie, odiodocinésie, passivité et réflexes pendulaires. C'est une ataxie qui ne se rencontre pas dans toutes les tumeurs frontales et qui n'a jamais été signalée dans d'autres affections que les affections tumorales. La pathogénie en est inconnue.

Une séance de cette société eut lieu à l'Hôpital du St. Sacrement, le 16 février 1945. Suivent les résumés des travaux présentés.

**PEMPHIGUS ÉPIDÉMIQUE DU NOUVEAU-NÉ.—M. Langlois et R. Thibaudeau.**

Présentée sous diverses appellations, cette affection est suffisamment répandue dans les agglomérations d'enfants pour causer des ennuis et très rarement des complications graves.

D'après cette étude, le pemphigus épidémique serait dû à la fragilité particulière des téguments sur lesquels le traumatisme paraît être lié à l'emploi varié des techniques de nettoyage chez le nouveau-né.

Les résultats personnels obtenus et ceux de Fischer, de Philadelphie (*Archives of Pediatrics*, juillet 1944) autorisent pleinement cette manière de voir et doivent inciter à orienter toute thérapeutique prophylactique ou curative en ce sens.

**CALCULOSE DE LA GLANDE SOUS-MAXILLAIRE.—O. Frenette.**

Résumé. — L'expérience a démontré que la stase salivaire seule est incapable de produire la lithiase des voies salivaires, de même l'existence de corps étrangers ne suffit pas pour expliquer la formation des calculs. Il faut admettre que l'infection joue le rôle catalyseur dans toute lithiase organique et que cette infection siège dans le voisinage du canal. Le même processus s'observe aussi bien à bouche qu'aux autres régions.

Plusieurs auteurs attribuent la fréquence de la calculose sous-maxillaire à la mucine contenue dans la sécrétion de cette glande, substance qui favoriserait le dépôt des sels de chaux sur des bactéries. La parotide ne produit pas de mucine et la calculose de son canal est-elle, dès lors, exceptionnelle.

Le patient A.C. est hospitalisé à l'Hôpital du St-Sacrement, à Québec, le 15 janvier 1945, pour une tumeur de la région sous-maxillaire droite. Il reçoit à chaque jour, pendant quatre jours, 1,000 c.c. de sérum mixte additionné d'une ampoule de Soluseptazine. Hygiène buccale et compresses humides.

Le calcul est extrait le quatrième jour par une incision parallèle au canal de Wharton. Le calcul a les dimensions d'un gros œuf de pigeon. Trois points de catgut ferment les lèvres de la plaie. Le malade quitte l'hôpital le troisième jour. Il est revu au bout d'une semaine et est considéré comme guéri.

**POLYSYNOVITE SUPPURÉE À BACILLES DE KOCH.—**

R. Lemieux, Chef du Service de Médecine et G. Drouin, Assistant dans le service de Médecine à l'Hôpital du Saint-Sacrement.

Les auteurs présentent l'observation d'une femme, âgée de 54 ans, qui depuis le mois de novembre 1943 est atteinte par un processus tuberculeux qui a atteint plusieurs gaines tendineuses (aux mains, à l'épaule droite, aux coudes, au poignet droit, et aux genoux) et quelques bourses séreuses. Aucun signe de tuberculose ailleurs.

L'examen histologique d'un fragment enlevé au niveau d'une gaine tendineuse de la main droite a permis de constater une lésion tuberculeuse, et l'examen bactériologique d'un produit de ponction au niveau d'une des gaines distendues au poignet gauche et à la jambe droite a permis de trouver du bacille de Koch.

Les observations de processus tuberculeux ayant une électivité pour le système séreux sont rares dans la littérature médicale.

**Toronto East**

Toronto East Medical Association is, in many regards, a unique society. It has regular meetings for scientific discussions but it is also organized along social lines. Bowling in the winter and golf in the summer have schedules that include almost the whole membership. Several parties for the doctors and their wives are held during the winter and the season will wind up this year with a three-night series of concerts in the Eaton Auditorium. Good planning and an advance sale of tickets ensure a revenue for other enterprises undertaken by the society. The enthusiasm of this group recalls the change that came in North Battleford years ago when the Doctor's Hockey Team put an end to professional rivalry and jealousy in that town.

M. H. V. CAMERON

**Vancouver Medical Association**

A special meeting of the Vancouver Medical Association was held on February 23 in the Vancouver General Hospital. The speakers were Dr. J. B. Collip, Director, Research Institute of Endocrinology, McGill University, and Dr. G. H. Ettinger, Professor of Physiology, Queen's University. Dr. Collip spoke on "Some recent advances in endocrinology", whilst Dr. Ettinger dealt with "Medical research during the war period". Both addresses were outstanding and we were very glad to welcome these distinguished men to Vancouver.

**Correspondence**

**Cancer Research**

*To the Editor:*

Newspapers have been commenting on the paucity of result in cancer research and one must conclude that much of the admirable work that has been done, has been in fields that cannot be made fertile and that we must look elsewhere for results. A striking feature of cancer and of lymph-adenoma is interference with the circulation of lymph and it is worthwhile to determine the effect of this on growth.

Oxidation of food is stated to produce  $\text{CO}_2$ , which forms di-carboxylic acids and other compounds which are active in the successive fermentations by which the energy of food is released. But the typical food molecule,  $\text{C}_n\text{H}_{2n}\text{O}_n$  does not contain sufficient O to form  $\text{CO}_2$  and protein even less, and as there is little free O in tissue, CO only can be formed. The end reaction in the cell is  $\text{CH}_2\text{O} + \text{O} = \text{CO} + \text{H}_2\text{O}$ ,  $\text{CO}_2$  is formed only in the blood and does not exist in body cells.

A cubic centimeter of substance divided into dice of the size of  $1/5,000,000\text{th } \mu\mu$ , about that



of the molecule of an element, furnishes the astonishing total of 30,000 square meters of surface. As electro-chemical action is due to surface inter-change, some idea may be formed of the tremendous effect of the molecules of electrolytes, which act as ferments, distributed in protoplasm throughout the body.

As O forms only 20% of air and the surface of the lung capillaries is very extensive, that of the ferments of the blood being incomparably more so, much the greater part of O is adsorbed by hæmoglobin and held until released by the unsaturated CO molecule. The avidity of the body for O, the rapidity with which CO inactivates the ferments of the blood and the quickness of death by suffocation all support this view. This being so, Wieland's theory that growth is due to fermentation without oxidation does not seem improbable. Chemical change in the cells may be due to reactions involving splitting of the molecule of water, as held by Gyorgyi, but reactions due to CO will be much slower than those caused by nascent O, and slight poisoning of the cells of the body, as distinct from the blood by CO, will run a very chronic course.

Molecules of CO in solution in the body, under pressure, which are brought within reacting distance of hæmoglobin are oxidized and secreted as CO<sub>2</sub>. Those in solution in the lymph and body fluids are poured into the veins, in sufficient quantity to prevent the retention level from rising and as they cannot react with carboxy-hæmoglobin are neutralized in the lung. Should there be interference with the circulation of lymph, unsaturated CO molecules will be retained and cannot remain inactive, and a slight blow or accident may cause pathological growth, as often happens. The patient however does not usually die from the tumour but from slow poisoning which saps vitality. With damaged or degenerating tissue in individuals in whom the reticulo-epithelial circulation is sluggish, abnormal growth is apt to occur. How CO reacts with protoplasm to cause increased intra-cellular activity and pressure, two potent causes of cell division and growth, is not known but the process quickly involves the glands, causing further stasis and as a growing tumour produces more CO, a vicious circle is established. Where stasis causes greater concentration of lymph and CO, growth will develop, elsewhere in the body the excess of CO is free to circulate and will cause symptoms of O poisoning with raised metabolic rate and consumption of tissue, but at a much slower rate than when due to O. Molecules which are deficient in O cannot cause O poisoning so that cachexia of cancer must be due to slow poisoning of the cells of the body by CO, the retention level of the gas being raised and the blood not affected till later in the disease. In Pauling's table of electro-negativities C has the value of 2.5, this is the square-root of negativity in volt

electrons, so that the v.e. value of C is 6.25, and as each v.e. = 23.05 kg. cal. the potential of the two free bonds of the C atom in CO cannot be ignored. C is the base and framework of tissue, without it there is no material life and in any disturbance of the equilibrium of tissue growth or maintenance the rôle of C must be dominant.

O with the much higher potential of 3.5 is not a builder but a destroyer of tissue and cannot cause over-growth. Injection of peroxide of hydrogen into tissues with retained CO will cause energetic action, the unsaturated molecules and stimulus to over-growth will be neutralized, the CO<sub>2</sub> thus formed will increase venous absorption and pressure and stimulate reticulo-epithelial circulation. Injection of H<sub>2</sub>O<sub>2</sub> into a tumour will cause absorption of tissue and relieve pain and pressure. Theoretically, the conditions which cause over-growth can be reversed, the task is to make this a practical everyday procedure.

Definite statements and symbols have been used in these paragraphs simply for brevity, the intention is to ask whether the conclusions reached are sound. Can the same stimulus which causes extensive absorption of tissue also give rise to tumour formation because stasis of lymph and congestion concentrate nutriment and active C in a focus, under pressure? While it has not been shown that active C is a dominant cause of cancer, existing conditions indicate that this is more than possible. The unique, additive property of C, making it the framework of about a quarter of a million of known organic compounds, is not possessed by any other element, so that the rôle of C in growth must be dominant.

We can perhaps prevent pre-cancerous conditions from arising by maintaining active inter-change in the hundred odd pounds of the fluid of the reticulo-epithelial system and adequate aeration of the blood by exercise and fresh air, but such measures will not disperse a tumour and the action of H<sub>2</sub>O<sub>2</sub> needs careful experimental study, with the foreign acid in the ordinary preparation neutralized. Concentrated H<sub>2</sub>O<sub>2</sub> will kill any tissue. A new Canti film, taken with the electronic microscope and stained if possible would be very instructive. The sequence and significance of movement in the original film were lost from rapidity of motion, and as in the proposed one the motion will be about ten times more rapid, the rate of motion must be greatly reduced to enable the film to be studied, this can be done.

Comparison of tissue cultures made in the usual way with others grown under air with varying quantities of O and of CO would give valuable information as to the effect of these gasses on growth.

Evidently the men who do things do not lack scope for constructive work.

1374 Sherbrooke St. West, RICHARD KERRY.  
Montreal.

## Positive Health

To the Editor:

In regard to the term, "positive health", as mentioned in the London Letter on page 298 of your February issue, might I, as a subscriber to your valued *Journal*, mention that the term, "positive health", was originally used ten years ago in England by an organization known as "Political and Economic Planning", the president at the time being Mr. Israel Moses Seiff, head of a chain of departmental stores operating under the name of "Marks and Spencer".

P.E.P. produced a semi-secret document entitled, "Planning and Freedom", in which "the shape of things to come" was outlined by the Fabian Socialists who were the principal members of that association.

That their influence is considerable is without question, because we find the ideas of P.E.P. being incorporated into many proposals in which the state machine would control the individual. Beveridge, Marsh, and other plans emanate from the London School of Economics which was subsidized by the Fabian Socialist, Sir Ernest Cassel, a German banker, for the express purpose, as stated to Lord Haldane, of "training the bureaucrats for the future socialist state".

When questioned regarding the tardiness of instituting P.E.P. plans, Mr. Israel Moses Seiff remarked, "We are waiting to see how our plan (the National Recovery Act) works out in America". It would be interesting to ask these planners if they ever planned the growth of a flower or any other organism. "Consider the lily . . . !"

Might I suggest a philosophy more in keeping with Christian principles, viz., that "Systems were made for men, not men for systems; and the interest of man, which is self-government, is above all systems, theological, political and economic."

J. VANS MACDONALD.

Vancouver, B.C.

## Special Correspondence

### The London Letter

[FOR FEBRUARY AND MARCH]

(From our own correspondent)

### HOSPITAL FOOD

About a year ago the King Edward's Hospital Fund authorities issued a memorandum on hospital diet which was mentioned in a letter about that time. It gave some straightforward advice on reform, based upon some startling revelations. A year later, *The Lancet* returns to the subject with a leading article and three subsequent articles which has stimulated correspondence in the lay press and a leading article in *The Times*.

In effect, what is now being said is that, with certain praiseworthy exceptions, hospitals have taken very little notice of the criticisms of a year ago. The blame is fixed fairly on the medical profession; it is the responsibility of the physician and surgeon to see that their patients are properly fed. If one member of every hospital staff could be filled with a burning zeal for improving diet, things would be done, despite war time shortages of cooks and apparatus.

It is soberly recorded that hospital patients are not even getting the rations to which they are entitled; and of course there is the reiterated complaint that the food is badly chosen, indifferently cooked and served in an unappetizing manner. Some hospitals have already instituted reforms; popular opinion will certainly press for a general levelling in an upward direction.

### ACADEMY OF MEDICINE

Once again this subject is being debated in the press, medical and lay. Briefly there are two schemes, one to associate the three Royal Colleges in London on one site and the second to develop this geographical association into a state assisted body, capable of speaking for the profession, negotiating with the Government and generally acting as the single authoritative voice of "Medicine".

The second scheme has been criticized as likely to sap the zeal of the profession "if all its professional bodies were over-organized under high direction". With regard to the former the Royal College of Surgeons in Lincoln's Inn Fields has purchased sites on either side of its own fine building and wants to persuade the Royal College of Physicians and the Royal College of Obstetricians to come and build new homes for themselves as the closest possible neighbours. But the R.C.P., with its long history of four-and-a-half centuries, has a fine building in Trafalgar Square which it enjoys rent-free from the Government and, although cramped in space, it is reluctant to leave. The subject has special interest to Canadian readers, for Canada House backs on the the R.C.P. and it is an open secret that the Canadian Government would welcome a chance to buy the R.C.P. premises.

The latest news is that the Council of the R.C.P. is considering the whole matter once again.

### INDUSTRIAL HEALTH

When the Government's White Paper on "A National Health Service" was published last year there was considerable disappointment that certain aspects of health were excluded, at any rate for the present. One of these was industrial health: the present services cover less than a quarter of the workers in industry and leave out not only the smaller factories but large numbers of undertakings not coming



under the Factory Acts, *e.g.*, offices, hotels, shops, transport undertakings, building works and much of agriculture.

Now the Royal College of Physicians has issued a report strongly urging a comprehensive service for industry to cover all workers wherever they work and closely integrated with any national health service. The report wants better trained medical officers, consultants and general practitioners, and close co-operation between employers and workers to secure the most efficient welfare arrangements in industry. Research in industry is also emphasized and especially, it is stressed, industry must not forget the lessons learned in the present time of stress.

#### OBITUARIES

Two deaths this month must be mentioned in any correspondence from London. We have lost our beloved "Tommie" Barlow in his 100th year, and a large assembly of his relatives, colleagues and pupils gathered at a memorial service recently to pay tribute to a wonderful life of service. To those of us in the pædiatric world it was particularly pleasing that he had lived long enough to see the new buildings at Great Ormond Street and to know that his great-grandson was working there where he himself had worked over seventy years before.

Another loss to the profession was occasioned by the death of Buckstone Browne, also a nonagenarian, and a generous benefactor to the Royal College of Surgeons. The experimental research farm and laboratories at Downe in Kent, on Charles Darwin's estate, was one of his great gifts and his name will be perpetuated there as a far-sighted supporter of modern surgical developments.

#### HOMELESS CHILDREN

Despite the amazing therapeutic developments of the past few years, there is a growing sense that what is termed social medicine holds possibilities for human betterment of even greater importance. Consequently medical practitioners are bestirring themselves in realms of human welfare which have not before been considered their business. Evacuation (of vulnerable cities) brought out many problems of children removed from the care and love of their parents and recent events with regard to remand homes, for the child delinquent for example; and of foster parents (there is a serious case of alleged manslaughter now *sub judice*); have served to focus attention on the medical and psychological aspects of a profound social problem.

An important governmental committee has just been set up to inquire widely into the whole matter of the child brought up away from home and it includes two medical men—one is a Professor of Child Health and the other is the present chairman of the London County Council. It seems clear that all cases of neglect are the

direct concern of the health and education authorities but even more important is to prevent such neglect by a proper selection of trained personnel and of foster homes. It was Bertrand Russell who stated bluntly some years ago that not everyone is fitted to be a parent. How much more must this be true of those who take the position of *in loco parentis*.

#### BURNS

Another group of problems with a definite social background is found in the modern study of burns. Coincident with valuable work in first-aid treatment, the combating of sepsis, the treatment of shock and the correction of metabolic disturbances, all recently discussed in a valuable Medical Research Council Special Report (No. 249), has been a study of the fundamental causes and results of burns.

Over four-fifths of these accidents are domestic in origin; over half occur in childhood and a quarter in the first three years of life. The provisions of the Children's Act of 1908 regarding fire protection in the homes are very largely ignored out of ignorance and lack of intelligence. Overcrowding and poor housing conditions contribute largely to the domestic accidents and it has been estimated that nine-tenths of the domestic burns were due to "avoidable accidents". About one-sixth of these domestic tragedies were due to hot tea!

The social results of burns present a serious problem. Over 1,500 people lost their lives from burns in Great Britain in a typical pre-war year and, deduced from hospital admissions, about eight times as many recovered with a loss of working hours—if out-patients are also included—in the region of over 6,000 man-hours per month. Education of the public in regard to safety in the home would seem to be an urgent problem of preventive medicine.

#### HEALTH SERVICE

Controversy has largely died down for the moment while a representative negotiating committee has frequent meetings with the Minister of Health. It has been generally agreed that administrative structure must be settled first, and there is widespread disappointment that the official plans for reform of local government appear to offer relatively little change. Sooner or later, however, matters more directly affecting the individual doctor will have to be discussed, and an important step in this direction has been taken with the setting-up of a committee to recommend "what ought to be the range of total professional income of a registered medical practitioner in any publicly organized service of general medical practice."

The terms of reference include consideration of the proper economic and social status of general medical practice and the necessity of attracting recruits.



## MEDICAL EDUCATION

The Goodenough committee made it clear that the reforms proposed in the education of the doctor would cost money and it is gratifying that the Chancellor of the Exchequer has promptly announced larger grants for university education. For general purposes the official grants are nearly doubled by the addition of an annual sum of £2,000,000 and the medical schools are to have a further £1,000,000 with half this sum for the teaching hospitals in virtue of the extra costs which they incur in their position.

Hospital grants for building have no real meaning until the way is clearer for such expansion, but token grants are included meanwhile with the promise of larger sums to come. Welcome for these financial aids is, however, tempered by the feeling that it will be a pity if "power of the purse" is used to insist on changes in medical education which are not altogether acceptable to the large majority of medical faculties. Not all of the Goodenough committee's recommendations come into this category.

ALAN MONCRIEFF.

London, March, 1945.

## Canadian Medical War Services

### MEDICAL OFFICERS APPOINTED TO THE R.C.A.M.C. — ACTIVE FORCE

JANUARY, 1945

(Previous sections appeared in the issues of February, March, May, July, September, November and December 1943, in each issue for 1944 except April and September, and in January and March, 1945.)

#### SECTION XXXIII

Name	Address	Date of appointment	Name	Address	Date of appointment
Asselstine, H. S.,	Windsor, Ont.	18-9-44	Plourde, P.,	Becancour, Que.	24-10-44
Cromwell, L. W.,	Victoria, B.C.	22-12-44	Rapp, C. G.	Taken on strength, Canadian Army Overseas	
Grenier, J.,	Labelle, Que.	18-12-44	Sneath, I. W.,	Regina, Sask.	17-11-44
Lesage, R.,	Quebec, Que.	11-9-44	Timmins, G. D.,	Fredericton, N.B.	5-9-44
Oberwarth, U. E.,	Women's General Hospital, Montreal	26-12-44	Whish, L. E.,	Toronto	25-9-44

### MEDICAL OFFICERS STRUCK OFF STRENGTH OF THE R.C.A.M.C.—ACTIVE FORCE

JANUARY, 1945

Name	Address	Date struck off strength	Name	Address	Date struck off strength
Brown, J. F. L.,	Woodstock, N.B.	11-1-45	McKenty, V. J.,	West Kildonan, Man.	6-1-45
Calder, J. R.,	Brantford, Ont.	15-12-44	McLachlin, A. D.,	London, Ont.	22-12-44
Collison, D. B.,	Vancouver, B.C.	22-12-44	Manning, H. E.,	Orono, Ont.	22-12-44
Feeney, M. W. C.,	London, Ont.	26-12-44	Melanson, H. P.,	Moncton, N.B.	28-12-44
Hamilton, G. F.,	Winnipeg, Man.	29-12-44	Shier, L. V.,	Lindsay, Ont.	13-12-44
Hitesman, R. J.,	Winnipeg, Man.	2-1-45	Turnbull, F. A.,	Vancouver, B.C.	25-12-44
Kristjansson-MacDonnell, J.,	Winnipeg, Man.	20-12-44	Whelpley, E. H.,	Angusville, Man.	31-12-44

### MEDICAL OFFICERS APPOINTED TO THE R.C.A.M.C. — ACTIVE FORCE

FEBRUARY, 1945

#### SECTION XXXIV

Name	Address	Date of appointment	Name	Address	Date of appointment
Lasalle, G.,	Ansonville, Ont.	1-2-45	MacRae, M. E.,	Edmonton, Alta.	7-2-45
MacLean, A. D.,	Winnipeg, Man.	5-1-45	Neil, R. B.,	Edmonton	7-2-45

### MEDICAL OFFICERS STRUCK OFF STRENGTH OF THE R.C.A.M.C.—ACTIVE FORCE

FEBRUARY, 1945

Name	Address	Date struck off strength	Name	Address	Date struck off strength
Bowering, M. W.,	Regina, Sask.	16-2-45	MacRae, F. R.,	Montreal, Que.	24-1-45
Crane, G. L.,	Radville, Sask.	1-2-45	Miller, S.,	Lachine, Que.	10-1-45
Davis, H. C.,	San Francisco	9-2-45	Pinch, J. C.,	Guelph, Ont.	17-2-45
Lindsay, R. D.,	Halifax, N.S.	13-2-45	(For those killed in action see the Obituary columns.)		

## University Notes

### McGill University

McGill University has prepared a plaque in memory of the late Lieut. F. B. Begor of the U.S.N.R. Medical Corps, which is to be placed in the ward room of the U.S. destroyer bearing Lieut. Begor's name.

The plaque reads as follows:

"In proud memory of Fay Broughton Begor, M.D., C.M., (McGill) Lieutenant (J. G.), Medical Corps, U.S.N.R., who was posthumously awarded the Navy Cross for his gallantry under fire on the beaches of Lae, New Guinea, in September, 1943, and in tribute to the four hundred graduates of McGill University who are serving with the armed forces of the United States of America."

Since the designing of the plaque, following the launching of the destroyer last May, many more names of McGill former students have been added to the honour roll of those serving in the United States armed forces. The total has now grown to 557, of whom 163 are in the U.S. Navy. Five of these hold the rank of commander and 59 hold the rank of lieutenant-commander. The U.S. Army, which has 385 McGill former students, includes among these, five with the rank of colonel and 19 with the rank of lieutenant-colonel. There are also eight in the U.S. Public Health Service.

Of those enlisted from McGill three were killed in the navy and seven in the army. There is one McGill graduate missing and two are prisoners of war from the U.S. armed forces. The total number of U.S. decorations gained by this group is 30, including four who won the Legion of Merit, one the Navy Cross, one the Distinguished Service Cross, four the Silver Star, and five the Distinguished Flying Cross, and other awards.

### Toronto

The following medals, scholarships and prizes have been awarded by the Senate of the University: Sixth year—The Cody Gold Medal, K. F. Clute; the Cody Silver Medal, J. V. Basmajian and H. Kalant; the William John Hendry Memorial Scholarship in Obstetrics and Gynaecology, H. Kalant; the Chappell Prize in Clinical Medicine, K. F. Clute; the Ontario Medical Association Prize in Hygiene and Preventive Medicine, W. R. Harris; the Dr. Roy Simpson Scholarship in Paediatrics, Miss E. V. Duggan; the David Dunlap Memorial Scholarship, sixth year, H. O. Barber.

## Miscellany

### "My Doctor Told Me"

What the doctor tells his patient matters a great deal; not only is this often the climax of reminiscences but it can be an important, even decisive, influence in determining what a sick man feels about his prospects. Experienced family doctors know this and are expert in choosing a few effective words that present the facts in a way the patient will understand.

Because the doctor and patient are in uniform these words are sometimes forgotten—"the doctor told me nothing". Such an omission is more than unfortunate; it leaves the patient wondering about the nature of his illness and perhaps exaggerating its effect on his health. To the patient a radiological or laboratory examination is naturally a major event whose result he is most anxious to know. If he is told nothing he is liable to fear the worst; to the doctor a negative result may not be of great interest, but to the patient it may mean release from anxiety that, unrelieved, will make him an invalid again before very long. No doubt there are moments when the doctor can say little of value and then he may be wise to say nothing; but at some point in every illness there comes a time for the doctor to tell the patient as clearly as he can what sort of illness this is and what sort of effects it has had. If a man's activities have to be restricted for a time it should be explained why, and perhaps emphasized that the time will come again for a resumption of normal life. For example, a patient who has recovered from pneumonia will feel the better for being told before he leaves hospital that his lungs have not been permanently damaged, that for a week or two he will not feel so fit as before, but that quite soon he may expect to be as well as ever he was.

There is one precaution to be observed by medical officers in such discussions with their patients. Questions of future category or probable fitness for particular duties are for consideration only by medical boards; they should not, therefore, be discussed between doctor and patient. But it should not be difficult to give the patient a friendly word about his health without expressing views that may come into conflict with later events if the patient is brought before a medical board.

Doctors owe their place in public esteem not only, or perhaps even largely, to their professional skill, but also to their fitness and willingness to be sound advisers and reliable confidants. What is true of civil practice is equally true of service practice. Indeed, the soldier as patient may need from the medical officer even more than the usual amount of that personal understanding and help which is our contribution to the doctor-patient relationship.—Army Medical Department Bulletin No. 39, War Office (London), Sept., 1944.

## MEMORIES OF BUDAPEST

By G. Harvey Agnew, M.D.

Toronto

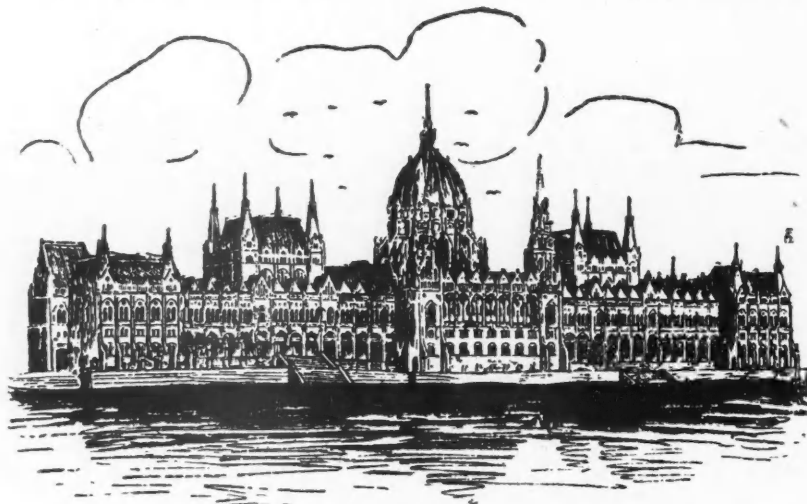
The terrific "no quarter" battle for Budapest which was still raging when we went to press\* must have wrought irreparable damage to one of the most beautiful cities of the world. The utter disregard of the Germans for the architectural treasures of their satellite partner and the misuse of these places for military purposes left the Russians with no recourse but to attack the Huns where they gave battle.

A number of years ago the writer, in company with two other Canadian physicians doing postgraduate work in Europe, had the opportunity of spending an all-too-brief period in this unique city astride the Danube. Prejudiced by the belittling remarks of their "superior" Danubian rivals, the Viennese, we were quite unprepared for the grandeur of this glorious

quarter the low houses built by the Turks during their occupation of the city 400-500 years ago were still in use, and horse cars plied on Margit's Island.

The old Basilica, dating back to the 10th century, reflected its changing ownership, the oriental decorations added by the Turks during their possession still showing in many places. A statue of St. Gerard stood atop high Mount Gerhardus (Gellerthegy) whence the Turks threw the martyr to his death on the riverbank below; it was for this resistance to the Moslem, we were told, that the Greek Church permitted the Magyars to use the double cross, similar to the emblem now used on Christmas Seal stamps.

It was there that an unusual experience befell the three of us one day. At high noon we were walking under the beautiful trees which shaded the "Ferenc Jozsef Quai", the broad riverside promenade which was the popular and fashionable "corso" where the best-dressed people strolled, and frequented the restaurants at noon



The New Parliament

city. We arrived by river steamer, one of those ludicrous little sidewheelers that pull down their hinged funnels and masts to crawl under the low bridges, just in time to see the sun set behind the high hill on the "Buda" side, silhouetting the Royal Castle, the Coronation Church, the Fisher Bastion and other edifices against a flaming summer sky.

The city was one of contrasts. The Royal Castle, or Palace, far surpassed that of Vienna, though little used by Franz Joseph, and could only be compared with Versailles. The New Parliament Houses, costing 32 million golden crowns, the Palace of Justice, the Bourse and a score of museums and educational institutions were monumental works of art. The mineral baths were the most pretentious in middle Europe and even the bridges were gems of design. On the other hand in the old Turkish

and again in the evening. Across the busy river rose the great castle-crowned hill of the right bank, making it one of the finest promenades of Europe.

While doing so we noticed an unusually well dressed gentleman keeping just in front of us, apparently listening to our conversation, which was a mixture of English and *schrecklich deutsch*. Immaculately dressed in a very light tropical suit with a Panama hat, cane and light gloves to match, he made a striking figure with his large but carefully groomed spade beard. In a few minutes he turned to us, bowed low from the waist and presented his card. Could he speak to us for a moment?

He was Baron ———, one of the few of his generation of the Hungarian aristocracy who had survived World War I and the socialist revolution which followed. With little left but his wardrobe and his dignity, he was devoting his time to the welfare of the sons and daughters

\* This was prepared in early February. Reproduced by kind permission of *The Canadian Hospital*.

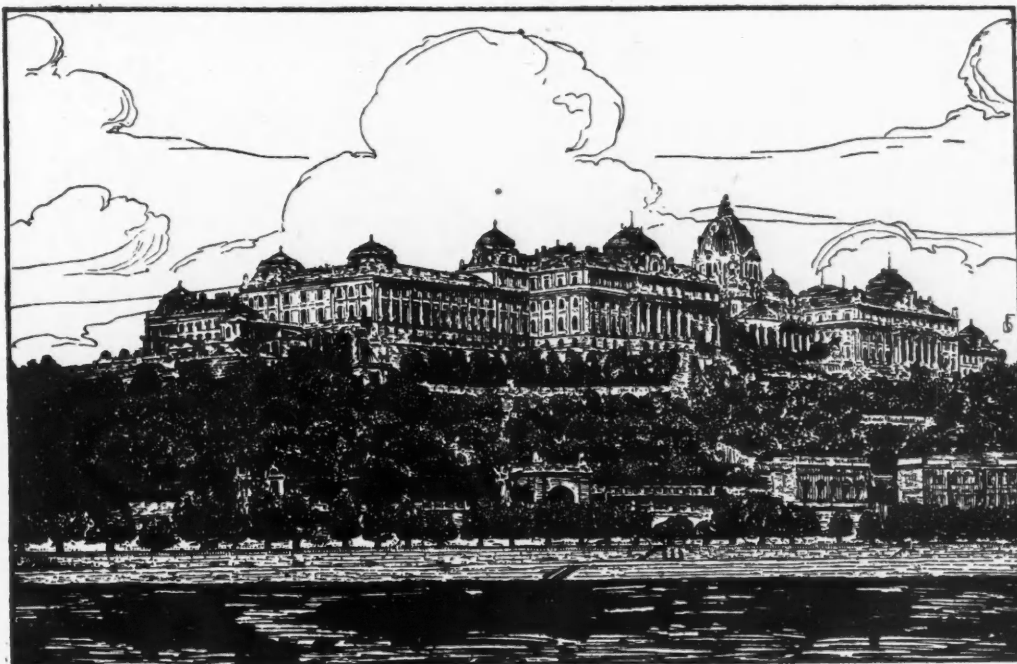


of his deceased friends. Thrown on their own resources, with a background of culture and education ill fitting them to earn their own living, these young men and women were having a difficult time indeed.

Realizing that the future of Hungary lay in closer relations with Great Britain, the United States and France, he had formed them into an "Englischklub". Once or more a week they met for dinner, discussion and some dancing. German and Magyar, their two normal languages, were forbidden at these meetings. All

towards improving the accent of other members of the club.

Returning that night it was my fate to commit a *faux pas* which no Continental would have made. Directing the taxi driver to the young ladies' address, I waited until I saw the janitor unlock the door, then drove off. Not until the 180,000 korona demanded by the taxi driver (only about \$2.50, but double rates because of being an "American") did I realize that courtesy would have required me to pay the doorman's fee for unbolting the door after 10 p.m.



**The Royal Castle**

*This magnificent building, high on the Buda side of the Danube, has a location unparalleled among world capitals.*

conversation must be in English; if they could not think of the English word, a French word or phrase might be substituted. Would we join them for supper that evening in the garden cafe of the St. Gellert and let his proteges practise their English on us?

We would and we did. The St. Gellert was the most sumptuous mineral-bath hotel in middle Europe and we found them in the delightful terraced cafe back of the institution. They were an interesting group. My companion at dinner, which was simple in keeping with their pocketbooks, was the daughter of the former governor of Transylvania, a young lady whose mental ability and linguistic talents had already obtained for her a secretarial post in the new government. From her I received much information respecting the long conflict between Hungary and Roumania over the possession of Transylvania; of their smouldering resentment against the Austrian attitude of superiority towards them; of their fear of German aggression in the future; and of their arts and literature. I fear that I contributed little that evening

## Abstracts from Current Literature

### Medicine

**Differential Diagnosis of Terminal Glomerulonephritis and Malignant Hypertension. 1. Renal Aspects.**  
Corcoran, A. C. and Page, I. H.: *Ann. Int. Med.*, 21: 747, 1944.

Terminal glomerulonephritis is distinguished by a low rate of glomerular filtration, of tubular secretory capacity, and, usually, a higher rate of proteinuria than appear in malignant hypertension with renal failure. In spite of the lower level of renal excretory function in terminal glomerulonephritis, such patients survive more than four times as long as do patients with malignant hypertension in renal failure.

In malignant hypertension with renal failure, intraglomerular hydrostatic pressure seems often to be increased above the normal and the flow of blood through the residue of intact tubular tissue is diminished, the latter presumably as the result of arteriolar constriction and (afferent) arteriolar sclerosis.

Evidence is obtained which suggests that the hypoproteinemia of Bright's disease, whether it occurs during chronic glomerulonephritis or in malignant hypertension with renal failure, apparently serves as a means of maintaining glomerular filtration when, in the absence of hypoproteinemia, the proportion of water

filtered through the glomeruli would be grossly deficient or nil.  
S. R. TOWNSEND

**High Fluid Intake in Management of Oedema.** Schemm, F. R.: *Ann. Int. Med.*, 21: 937, 1944.

The effects of a regimen in which a very high fluid intake was enforced, on patients with oedema and cardiac disease, are reported as observed and studied for eight years in 626 separate periods of treatment of 402 cases. The method used in the study is outlined, the material analyzed, and some of the general and specific observations are presented.

It was observed that patients with marked oedema, particularly the 94% with gross cardiopathy, tolerated the high fluid intake with impunity and the results were better than those formerly obtained with the restriction of fluids.

It is suggested that the regimen used is physiologically sound and that it is clinically useful in the correction and prevention of the intimately related phenomena of oedema, oliguria, or anuria and dehydration, wherever they are encountered or anticipated.

The observations appear to call for a critical re-examination of the accepted clinical practice of the restriction of fluids in the presence of oedema, and the accepted hypotheses regarding oedema formation and congestive heart failure upon which this practice is based.  
S. R. TOWNSEND

**The Army Air Forces Rheumatic Fever Control Program.** Holbrook, W. P.: *J. Am. M. Ass.*, 126: 84, 1944.

This article is based on the experience of the American Army Air Force in the prophylactic use of sulfadiazine. Evidence is given of the importance of rheumatic fever in producing morbidity in young soldiers and its rather close relationship with hæmolytic streptococcus infections. Figures are also given to show the rather wide geographical variations in morbidity from rheumatic fever; the more southerly regions of the U.S.A. have a much lower incidence in the experience of the Army Air Force.

A number of observations are reported on the results of the prophylactic use of sulfadiazine in reducing the incidence of respiratory diseases. Soldiers who receive one gram of sulfadiazine daily or two grams every second day or even 0.5 gm. daily appear to show a much lower incidence of respiratory diseases than control groups. The decrease usually amounts to 50 to 75% and is maintained while sulfonamides are being given. When they are discontinued morbidity tends to return to former levels. No figures are given of the effect on rheumatic fever but the impression is that its morbidity drops in a somewhat parallel fashion to the drop in respiratory diseases.

Among 40,000 soldiers to whom sulfadiazine was given as a prophylactic, 13 individuals had drug reactions causing loss of time from duty. The majority of these reactions affected the skin. Two of the 13 reactors had high febrile reactions and one developed an anæmia which responded to transfusions. There were no deaths: 33 other soldiers in this group had mild disability (mostly skin) not involving loss of time. No evidence was found to suggest that sensitization took place in these soldiers, many of whom had repeated courses of sulfonamide prophylaxis. The question is raised as to whether the use of sulfonamides in mass prophylaxis might not tend to produce sulfonamide-resisting strains of bacteria. This question can not be answered at present.  
FRANK G. PEDLEY

**Epidermolysis Bullosa.** Nippert, P. H. and Fetter, F.: *U.S. Naval Medical Bull.*, 44: 154, 1945.

These authors report the cases of seven men in the armed forces who were incapacitated for military service because of the tendency to form blisters on their feet when wearing shoes and walking for any length of time. In six of the seven cases there was a marked hereditary history. In one, the mother, sister and

brother were similarly affected; in the second, a sister and brother, the mother, grandmother, two maternal uncles and seven of their children had the defect. In a third, five of the man's nine brothers, one of his five sisters, and the father had the disease. In the fourth, one of the patient's sisters, two of his brothers, his father, a paternal aunt and uncle and ten cousins had epidermolysis bullosa. In the fifth, the father, a paternal aunt and uncle and his small son were affected. In the sixth instance there was a very extensive family history of this condition, there being a total of 22 persons with the condition in four generations. Twice in this family it had appeared to skip a generation. Two men, whose mother and whose brothers and sisters were affected, but themselves were listed as normal, had affected children. In each of these cases, the line of descent appeared to be direct, with the exception of the instances just noted; so that the defect behaved as if dependent upon a dominant character.  
MADGE THURLOW MACKLIN

**Proteolyzed Liver in the Treatment of Refractory Anæmias.** Davis, L. J. and Davidson, L. S. P.: *Quart. J. Med.*, 13: 53, 1944.

\* Proteolyzed liver is a papain digest of whole liver suitable for oral administration. It was employed by the authors in the treatment of 13 cases of severe anæmia which had proved refractory to other agents, including injections of liver extract of known potency. In five of these cases where the blood and sternal marrow pictures were respectively macrocytic and megaloblastic (as in pernicious anæmia, although only one case fulfilled the other criteria of this diagnosis) a rapid restoration of health occurred. In three more cases where the blood was macrocytic, the marrow predominantly normoblastic but partially megaloblastic, definite improvement took place. In the remaining five cases of aplastic anæmia proteolyzed liver was as unsuccessful as any other form of treatment.

The suggestion is made that proteolyzed liver contains some hæmatological maturation factor additional to the anti-anæmiac factor present in fractionated liver extract.  
NORMAN S. SKINNER

## Surgery

**Closure of Defects of Lips with Composite Vermilion Border-Lined Flaps.** May, H.: *Ann. Surg.*, 120: 214, 1944.

Defects of the lips large enough to prevent direct closure can be closed by transplantation of flaps either from the immediate neighbourhood or from some distant part. Composite vermilion border-lined flaps from the immediate area are preferable.

Estlander's operation is advised for closure of vertical lip defects not larger than half the width of the lip. The defect is closed by rotation of a full thickness flap from the opposite lip. It is pedicled at one side of the vermilion border which contains the coronary artery. If the pedicle forms the new corner of the mouth some vertical shortness results. The switching of triangular flaps as in a Z plastic is recommended, to be done three weeks after the primary operation. A more natural corner is formed. For the repair of large triangular defects of the lower lip the shifting of adjacent tissue into the defect is recommended.

Two triangles of skin and muscle in the nasolabial region are sacrificed. The mucous membrane underlying the excised triangles is formed into flaps and used to lengthen the vermilion border. Usually a small triangle of skin at the corner of the mouth requires excision to make room for the flaps. Laterally the new lip may require excision of a wedge of subcutaneous tissue and muscle to thin it. Mobilization of the cheek flaps is done by an incision along the lower gingivo-buccal sulcus. Dissection should be carried back to the anterior border of the masseter.

Lined flaps from other parts of the body may be used in repairing defects of entire lower lip and chin.



If the defect can be made triangular the operation described above may be done. Advantages are (1) excision of diseased part and closure in one operation, (2) replacement of lost structures by similar structures.

If the defect includes only one-half of the corner of the mouth and parts of the adjacent cheek, and if the defect can be made triangular Estlander's operation is the one of choice. If the entire angle of the mouth and adjacent cheek must be excised a diamond shaped defect should be left. It is closed by starting closure at the corners.

**Fracture of the Zygomatic Tripod.** Ungley, H. G. and Suggit, S. C.: *Brit. J. Surg.*, 32: 287, 1944.

The authors discuss 14 cases, clinical details of which are given. Flattening of the facial contour was the most characteristic deformity. It is most noticeable from the side view. In all cases the fracture was palpable along the orbital margin. Half of the cases showed evidence of interference with the infra-orbital nerve. Three of the cases had diplopia. Antral hæmorrhage is usually present. It is additional evidence of fracture on x-ray examination. It did not give rise to any complication. Six of the 14 cases showed unilateral epistaxis. One case had surgical emphysema of the face. Difficulty in closing the jaws was present in one case. The most useful x-ray view was the mentonasal. Radiological points to note are: (1) the degree of comminution of the anterior antral wall; (2) the degree of impaction and telescoping of the zygoma into the cavity of the antrum; (3) separation and/or fracture in the region of the zygomatico-frontal synostosis; (5) separation and/or fracture in the region of the zygomatico-temporal synostosis.

Fractures of the zygomatico-maxillary arch result from direct injury. The characters of the fracture vary with the direction and site of the blow.

Expectant treatment is to be condemned. Early operation is advised. Fractures can be reduced even when a long period has elapsed since injury. Operation should always be attempted if obvious deformity or diplopia is present. Intratracheal inhalation anaesthesia was used in all cases. An oral pack was always used. Local infiltration of novocain and adrenalin in the canine fossa was found useful when this approach was used. Reduction was done either by the temporal or canine approach. The latter is particularly useful if there is extensive comminution. If diplopia with wide separation between zygomatic and frontal bones is present or if there is a large deficiency of the anterior antral wall fixation with stainless steel wire at the zygomatico-frontal process will maintain reduction. Three methods were used to obtain fixation of the fracture line in the anterior antral wall; simple impaction, wedging with one of the loose bone fragments, and wiring. External fixation was not used in this series.

Deformity tends to increase if the injury is untreated. Infra-orbital neuralgia is an unpleasant sequel. It occurs more particularly in the untreated case. Diplopia is the most important eye complication. It persists if the fracture is not reduced.

**Resplitting Split Thickness Grafts with the Dermatome.** Zintel, H. A.: *Ann. Surg.*, 121: 1, 1945.

Limitation of the amount of available skin often makes management of large skin defects difficult. Early covering of such defects undoubtedly reduces morbidity and mortality. In a limited number of cases the use of the "split-split" graft has been successful.

A thick graft is cut with the Padgett dermatome. While still adherent to the drum the knife is adjusted to half the original distance. Splitting of the graft is started one-quarter inch from the end. It is possible to cut a Padgett graft into three layers.

Skin from one donor area can be used to cover a defect two, or three, times larger. The inner layer of the "split-split" graft epithelializes in about the same time as the donor area.

**Dupuytren's Contracture: Fibroma of the Palmar Fascia.** Clay, R. C.: *Ann. Surg.*, 120: 224, 1944.

Previously suggested etiological factors of Dupuytren's contracture are trauma, familial trait, focal infection, ulnar nerve lesions, endocrinopathy, local inflammation, embryonal malformation, palmar atrophy with advancing age, and lead poisoning. Material from 22 hands of 17 patients has been studied by the author. It is concluded that the lesion is neoplastic; a poorly demarcated fibroma composed of small, spindle-shaped cells, with elongated nuclei which contain finely granular chromatin particles. Cytoplasm is scanty and poorly outlined. These cells are embedded in a matrix of fibrous tissue suggestive of normal fascia. No mitoses are seen. Inflammatory cells are almost non-existent. The lesion is identical with benign fascial fibromata found elsewhere, e.g., desmoid tumours of the abdominal wall, and is benign. There is no record of metastases.

**Wounds of the Chest in Pacific Jungle Warfare.** Hardt, H. G., Jr.: *Arch. Surg.*, 49: 367, 1944.

The clinical course and end results of penetrating war wounds of the chest are influenced by three general factors: (1) the size, irregularity, velocity and course of the penetrating missile; (2) the general physical condition of the soldier when wounded, and (3) the promptness of first aid and the early transportation of the wounded man to a hospital which has adequate facilities and personnel for the care of wounds of the chest. The author reports a series of 32 patients with wounds of the chest. All of these patients were evacuated by air over approximately 900 miles. The most commonly seen wounds were caused by fragments of a Japanese 50 mm. mortar shell. In 9 of the 32 cases the wounds were perforating and in 23, they were penetrating, with the foreign bodies lodging in the tissues. Shock was severe in only 6 patients. These patients responded well to blood transfusions and plasma.

Hæmoptysis was observed in 19 instances. Hæmothorax was present in 26 cases and varied from the smallest amount detectable by roentgenogram to almost complete filling of the pleural cavity. Pneumothorax was present in 10 cases. As complications, there was one patient with bronchopleural fistula and there were two with infected hæmothorax. Two patients developed pneumonitis and 3 had infected wounds. There were no deaths among the 32 patients of the series.

Local application of sulfanilamide crystals was used routinely for all wounds. Exploration and débridement of the wounds were done in almost every case. In seven instances of open suction pneumothorax, the opening was closed. The wounds were closed primarily in 14 cases. As considerable variation of opinion has existed in medical literature regarding the care of hæmothorax of traumatic origin, the author cites the following indications for aspiration: "(1) use aspiration and replacement with air during the first 72 hours after the wound is incurred, if excessive dyspnoea exists or if continued bleeding from the pulmonary parenchyma is suspected. (2) If a persistent daily temperature reaching 100° F. exists with no other source of fever present, aspirate the blood. Do not replace it with air. (3) Do diagnostic aspirations frequently. (4) Allow asymptomatic hæmothorax to remain undisturbed."

G. E. LEARMONTH

**Choice of Incision in Gall-bladder Surgery as a Factor in Preventing Wound Disruption, Evisceration, and Herniation.** "Du choix de l'incision dans la chirurgie de la vésicule biliaire et tant que facteur de prévention d'éventration, d'éviscération et de hernie." De Courey, J. L.: *Surg., Gyn. & Obst.*, 79: 606, 1944.

L'auteur examine les différents facteurs qui prédisposent à l'éventration, à l'éviscération et à la hernie abdominale post-opératoire, à la fois en regard du sujet et du point de vue de la technique opératoire. Après d'autres auteurs, il constate la fréquence de ces com-



plications et il conclut que la déterminante majeure de ces suites post-opératoires désastreuses réside dans le choix de l'incision.

L'auteur examine la disposition des muscles et aponévroses rencontrés au cours d'une laparotomie pour opération sur la vésicule biliaire. Il réclame comme essentielles, dans ce genre d'opération, une large exposition assurant une bonne visibilité et la manipulation facile des organes, et une suture rapide.

Parmi les incisions les plus fréquemment employées il nomme: (1) l'incision en bayonnette (Mayo-Robson); (2) la para-médiane (Kammerer); (3) la médiane (Kammerer); (4) la para-médiane verticale haute (Deaver), et (5) la transversale ou sous-costale. L'auteur décrit ces incisions et en discute la valeur. Il constate une tendance générale à abandonner les incisions verticales en faveur de la transversale. A son avis, il ne saurait préconiser l'emploi invariable de cette dernière dans tous les cas. S'il la préfère quand il s'agit de sujets obèses, il emploie dans les autres cas l'incision para-médiane en ayant soin de procéder à la suture après entrecroisement aponévrotique de la même manière que dans les cas d'opération secondaire de hernie.

PIERRE SMITH

### Gynæcology and Obstetrics

**Orthostatic Albuminuria Developing Late in Pregnancy.** Simon, H. J.: *Am. J. Obst. & Gyn.*, 48: 717, 1944.

A case of orthostatic albuminuria occurring late in pregnancy is detailed. This diagnosis is probably indisputable, nevertheless, in fairness we may point out the following: the blood count showed a leucocytosis and a shift to the left in the differential. However, this is surely not the blood picture of a toxæmia; the Van Slyke index standard clearance is at the lower limits of normal; the functional phenolsulphonphthalein test showed a delayed excretion, but this might be explained by the fact that the patient was at term and there is a known hydronephrosis and hydroureter late in pregnancy. Finally the absence of subjective symptoms, the occurrence of albumen in the urine only on assuming the erect posture, the normal weight gain, the absence of œdema of the face or extremities, the repeatedly normal blood pressure readings, the absence of eye ground changes, plus the essentially normal blood findings, all confirm the diagnosis.

ROSS MITCHELL

**An Analysis of Sterility Studies in the Female.** Nico-demus, R. E. and Ritmiller, L. F.: *Am. J. Obst. & Gyn.*, 49: 95, 1945.

Seventy-six cases of sterility in the female are analyzed. The studies that afforded the greatest information as to the cause of sterility were basal metabolic determinations, hysterosalpingograms and tubal insufflations.

The greatest number of pregnancies occurred in the hypothyroid and ovarian dysfunction groups that received thyroid extract, œstrogenic therapy and/or follicle stimulating hormone.

Of 76 cases studied and treated, a total of 29 pregnancies resulted, three of which terminated in spontaneous abortion and the remaining 26 were delivered of normal healthy babies.

ROSS MITCHELL

**Carcinoma of the Ovary.** Williams, I. G.: *J. Obst. & Gyn. Brit. Emp.*, 51: 489, 1944.

The prognosis of ovarian carcinoma is good when the disease is confined to one ovary and immediate surgical treatment is given. Although the number of cases is small the addition of postoperative x-ray therapy very slightly improves this survival. Four unilateral cases were operated on later for carcinoma or a metastasis in the other ovary. The fact that these patients died within 1 year of the second operation from disseminated disease suggests that in all these cases the involvement of the second ovary was due to a meta-

stasis. In all these cases the tumours were apparently confined to each ovary and local glandular or peritoneal metastases were not detected at operation. Operation was classified as incomplete when, owing to adhesion to intra-abdominal organs, the surgeon was convinced that tumour tissue was left behind. Operation alone may result in long survival in these patients, but a greater number are salvaged if postoperative radiotherapy is given. The numbers are small but expressed as a percentage, almost double the number are alive and well at the end of 3 years. (In this table figures are only available over a period of 3 years for survivals. In all other tables 5-year survivals are expressed in the percentage figures.) Operation was incomplete in 4 cases and none of these patients survived 5 years in spite of postoperative radiotherapy—although one patient survived 4 years after treatment.

P. J. KEARNS

**A Case Report of the Effect of Hysterectomy on Ovarian Activity in the Female Baboon.** Gillman, J. and Gilbert, C.: *J. Obst. & Gyn. Brit. Emp.*, 51: 495, 1944.

The reactions of the perineum of a mature baboon are described over a period of 4 years following hysterectomy. It was shown that hysterectomy leads to reactions which could be interpreted as indicating altered ovarian function. This disturbance of ovarian function is very marked in the 4th year, despite the presence of seemingly normal ovarian tissue. Comparison with the human female suggests that the impairment of ovarian function after hysterectomy is much more rapid in women than in the baboon.

It is suggested that the development and persistence of the hot flushes for prolonged periods after hysterectomy depend upon the presence of at least some functional ovarian tissue.

P. J. KEARNS

**Recurrent Anencephaly.** Dunn, H. G. and Salter, J. G.: *J. Obst. & Gyn. Brit. Emp.*, 51: 529, 1944.

The recurrence of malformations in siblings, sex and racial incidence are strongly suggestive of a hereditary causation, but only family incidence is real proof, and unfortunately the evidence for this is scanty in anencephaly. Among the environmental factors, maternal age appears to be the only one of proved significance. Hence, although definite proof is lacking, it may be assumed in the present state of our knowledge, that anencephaly and similar malformations probably have an hereditary basis varied by maternal age and possibly by other environmental factors. In the case of spina bifida, Penrose thought the simplest explanation was that the deformity was due to a partially dominant gene whose variable expression was connected with maternal age. This may also apply to anencephaly and could be brought into line with the genetic experiments of Snell and Picken in mice. In addition, there is presumably an hereditary association between anencephaly and other congenital malformations, particularly of the nervous system.

P. J. KEARNS

### Pædiatrics

**Hereditary Periodic Paralysis in a Family Showing Varied Manifestations.** Oliver, C. P., Ziegler, M. R. and McQuarrie, I.: *Am. J. Dis. Child.*, 68: 308, 1944.

This condition has often been regarded as benign, causing inconvenience to the patient who awakes to find his muscles paralyzed, but showing nothing more serious, since the paralysis passes off in a few days. In this family, however, one boy of 17 died in an attack when the respiratory muscles were involved. A man, 4 of his 7 children, and 11 of his 38 grandchildren showed the condition. It came on as early as 4 years of age in some, as late as 35 in others, with most of the patients showing attacks by the time they were 16.

The attacks come on when the potassium concentration in the blood falls below a critical level, and can be averted or cured by the administration of potassium

chloride. Attacks can be precipitated by giving glucose, or insulin. This explains the frequency with which the attacks make their appearance a few hours after a full meal, when the sugar level of the blood is likely to be raised. Attacks in these patients supervene when the ratio of dextrose to K level rises to 70 or 80.

MADGE THURLOW MACKLIN

**Familial Character of Fibrocystic Disease of the Pancreas.** Howard, P. J.: *Am. J. Dis. Child.*, **68**: 330, 1944.

Two families are reported in which a familial incidence of this condition was noted. In the first family, two children were affected. Five of the mother's brothers and sisters had died in infancy, cause unknown.

In the second family, two girls and one boy were affected; three boys were normal. Seven of the paternal grandmother's siblings had died in infancy of an unknown cause. Whether these infant deaths had any relationship to the fibrocystic disease found in these patients is not known.

MADGE THURLOW MACKLIN

### Otolaryngology

**Relationship of Poliomyelitis and Tonsillectomy.** Howard, R. E.: *Ann. Otol. & Laryngol.*, **53**: 15, 1944.

During the seven-year period from 1937 to 1943 inclusive, there were 36,295 tonsil operations in the hospitals of Cincinnati, of which 23,442 were tonsil and adenoid operations on children of the age most susceptible to poliomyelitis. There have been 257 cases of poliomyelitis of which 233 have occurred in the 4 months of July to October; the remaining 24 were mostly in November. Only 6 cases of poliomyelitis were observed, 3 spinal and 3 bulbar cases resulted, with one bulbar death and 5 recoveries with minimal paralysis; 5 of the 6 tonsillectomies were done early in July, 1937, 1939 and 1942, before one realized the presence of the virus in the locality and thus probably the cases could not be avoided. However, counting the entire group the ratio of poliomyelitis to tonsillectomies and adenoidectomies performed during the 4 month period is 1 to 2,000, and to the total number of cases of poliomyelitis 1 to 40. The possibility of poliomyelitis following tonsillectomy and adenoidectomy in the other eight months is nil, except in Texas and California where the poliomyelitis season is extended from June to November and sometimes includes December.

Since 1933 numerous examinations of the olfactory bulbs of patients who have died of poliomyelitis have failed to demonstrate, except in a few instances the virus or its inflammatory reactions in the bulb. The consensus at the present time regarding the portal of entry is that the virus enters through the mucous membrane of the alimentary tract, upper, lower or both.

Preventive medicine shows that during months and years when there are epidemics of poliomyelitis, operations on the nose and throat should be avoided whenever possible and it is wise for otolaryngologists to cooperate in this respect.

V. LATRAVERSE

### Anæsthesia

**New Technique of Spinal Anæsthesia.** Hunter, A. R.: *The Lancet*, **1**: 82, 1945.

The author points out that spinal anæsthesia is frequently induced by empirical methods so that its action is sometimes capricious and occasionally dangerous. He suggests the use of larger volumes of diluent in order to reduce the concentration of the drug to the minimum which will induce anæsthesia. The height to which sensation is abolished will be governed by the volume of the solution and its concentration. If this minimal effective concentration is used, any spread beyond the area in direct contact with the solution will be impossible even if the table is tilted in the wrong direction.

Pannett in 1929 demonstrated that 0.5 and 1% procaine were inadequate for spinal anæsthesia but that

1.66% would induce satisfactory anæsthesia and muscular relaxation. The author has worked out by a process of trial and error, the concentration for the intact human subject and gives them as follows: amethocaine (pontocaine) 0.1%; nupercaine 0.08%; procaine 1.25%.

The volumes of the solutions of these drugs used will of course depend on the capacity of the spinal canal up to the level to which it is desired to produce anæsthesia. The author's clinical findings are that 4 c.cm. of solution will produce anæsthesia to the level of L 1; 8 c.cm. to D 10; and 12 c.cm. to D 6. These levels correspond approximately to Poupart's ligament, the umbilicus, and the xiphisternum. A table of dosages is given for the three drugs. One example may be taken: 12 mgm. of pontocaine dissolved in 12 c.cm. of spinal fluid will give anæsthesia for laparotomies to the level of D 6 according to the author, which he claims is sufficient for nearly all major surgical procedures amounting to some 3 hours!

(Abstractor's note. These concentrations seem incredibly weak and it is difficult to conceive of employing them effectively in any other manner than by the continuous spinal technique of Lemmon. This the author fails to specify and from the context the implication is that the single dose technique is employed. If this is true, and the results obtained are consistently successful as regards sensory loss, muscular relaxation, and duration of both of these factors, the author has made a contribution that is revolutionary to our present conception of spinal anæsthesia.)

F. ARTHUR H. WILKINSON

### Radiology

**Intrathoracic Hodgkin's Disease.** Wolpaw, S. E., Higley, C. S. and Hausser, H.: *Am. J. Roentgenol.*, **52**: 375, 1944.

Of 55 proved cases of Hodgkin's disease in which chest roentgenograms were available, 35 or 63%, showed intrathoracic involvement. The varied manifestations of intrathoracic Hodgkin's disease were correlated with the distribution of lymphoid tissue within the chest. Mediastinal, parenchymal, pleural, osseous and cardiac types were described and illustrated by 15 case reports.

Roentgen therapy was discussed and it was concluded that the majority of patients with intrathoracic Hodgkin's disease will show definite but varying degrees of favourable response to roentgen treatment.

R. C. BURR

**The Investigation of Sciatica and Lumbago—the Radiological Aspect.** Brailsford, J. F.: *Brit. J. Radiol.*, **17**: 308, 1944.

Lesions of the intervertebral discs may be recognized from the plain radiograph by calcium deposits within it, by narrowing of the intervertebral space, and by certain deformities in the vertebral bodies, while protrusions from the disc into the spinal canal can be detected only after the injection into it of lipiodol, etc., and by screening the patient on a tilting table and watching the flow of lipiodol past each interspace. Following spectacular recovery from the signs and symptoms of cord pressure by the operative removal of certain cartilaginous protrusions into the canal, the formidable procedure was hailed by many surgeons as if the lesion was the long-sought-after cause for most of the severe symptoms of low back pain or sciatica. This is just another demonstration of relative ignorance of the frequency and significance of certain anatomical conditions. The radiographical demonstration of the low stomach and the operative measures for correcting it was an example of a former unnecessary operative procedure. Protrusions of the disc are relatively common in patients who have not complained of symptoms: they were demonstrated and described by Schmorl in a large percentage of many spines. They are relatively stable, and not subject to recurrent disturbances and recovery such as we commonly see in sciatica and



lumbago. That spectacular recovery occurs in a very few selected cases, and in a number of the cases operated on by all surgeons, is not to be wondered at, since physicians have seen such recoveries following so many simple and diverse procedures, that they consider hysteria to be a prominent factor. R. C. BURR

### Pathology and Experimental Medicine

**A Simple Technique for Rapid Sectioning.** MacMahon, H. E. and DelVecchio, S. B.: *New England J. Med.*, 231: 794, 1944.

The value of immediate pathological diagnosis at time of operation cannot be over-emphasized. A simplified method has been developed by the authors which has proved, after over a year of trial during which it was constantly checked by the usual frozen and permanent sections, to be equal or superior in accuracy to the latter methods.

The simple equipment required consists of a safety-razor blade, a clean slide and coverslip and a prepared stained slide. The latter is prepared by coating one surface of the slide with Mayer's albumen-glycerin mixture (a space being left at one end for handling) then dipping it for a few seconds in a 1% aqueous solution of toluidine blue. The slide is drained, the reverse side wiped dry and it is then left on a flat surface to dry. These slides keep indefinitely.

At the time of operation a thin section is cut with the razor blade. Holding the section on the blade it is gently placed on the ball of a finger. The stained slide is then lightly and quickly drawn across the section, staining only one side of the tissue. After immersion in water the tissue is mounted on a slide, covered with a coverslip and examined under strong light.

NORMAN S. SKINNER

### Industrial Medicine

**Medical Certification in Industry—Comment and Opinion on this Increasing Responsibility of the Industrial Physician.** *Indust. Med.*, 13: 750 1944.

In this article opinions on medical certification are expressed as they appeared in the *New England Journal of Medicine*, August 3, 1944, in an editorial on the subject, a letter from an industrial physician and a statement by the War Participation Committee of the Massachusetts Medical Society.

With the development of modern society, the demand for medical certification has assumed vast proportions, creating a heavy burden for the doctor. He has been the logical person to certify birth and death, insanity, and the occurrence of contagious disease, and to express opinions concerning all sorts of controversial situations. In carrying out these duties character and integrity count more than skill and knowledge and the prestige of the medical profession is influenced by the manner in which the responsibilities are met. Not only the individual, but also such groups as insurance companies, benevolent societies and industrial enterprises, have claims on medical science and opinion. The rapid growth of the insurance principle during recent years, has led to an increase in the need for medical certification. Medical judgment is required when deciding compensation status. The need to limit absenteeism in industry has focussed attention on the character of the medical certificates. The function of the physician is to verify the existence and character of illness, for legitimate ends. Attention is drawn to cases in which certificates issued have been used for illegitimate reasons, and to the possibility of a patient blaming his working environment and influencing his family doctor to a wrong diagnosis. Physicians should protect themselves by using confirmatory sources of information to check all facts. The state and federal divisions of industrial hygiene are always available for this purpose.

MARGARET H. WILTON

**Psychogenic Factors in the Care of Women Workers—a Practical Approach for the Industrial Physician.** Dakin, M. J.: *Indust. Med.*, 13: 459, 1944.

The author who is plant physician at Lockheed Aircraft Corporation, Burbank, Calif., tells of her 4 months' experience working incognito in the factory as a trainee and production worker, in order to acquire a true appraisal of the actual physical and mental stresses inherent in the jobs undertaken by women in aircraft industry. Her information has served as a basis for evaluating the psychogenic factors in the women's problems.

She affirms that aircraft work is not too heavy for the physical capabilities of the average woman. The only jobs that tired her physically were those on which she was unhappy. In "rivet arm" and "riveters' ovaries" a major factor is the emotional response of the employee to the specific job. The importance of the pre-employment examination and its relation to proper placement, is stressed. The general physical, mental and emotional attributes of each woman applicant should be sized up by the examining physician. Of equal importance is her training or induction period, during which time she has to make a complete emotional adjustment to the factory environment. In order to more efficiently utilize this newer understanding of the problems of women employees, the Lockheed medical department has instituted a centralized agency, the "Women's Clinic". Here are handled all cases in which a physical complaint is thought to be due to the cumulative effect of the patient's work. The author discusses the operation of the clinic and shows how by considering psychogenic factors it has made an important contribution to the management of medical problems in women.

Reference is made also to "trouble-shooting", another field of usefulness which has been explored by the Women's Clinic. Studies are made of situations that occur and recommendations are made for their correction. One study is discussed and details of the findings and subsequent results presented. MARGARET H. WILTON

### Obituaries

**Dr. Robert Allan.** Alberta lost one of her early physicians in the person of Dr. Allan, who passed away in Calgary, February 16. While this was still part of the North West Territories, Dr. Allan registered and opened an office in Innisfail. He graduated in the class of 1903, McGill University, and shortly after registered in Manitoba where he practised for some months at Roblin, before settling in Alberta.

While for the most part a rural physician, he did practise in Calgary for a time. Among the other places where he rendered service the following may be mentioned: Castor, Estevan, Sask., and Coronation. He was 74 years of age.

**Dr. E. C. Barnes,** for over 23 years medical superintendent of Selkirk Mental Hospital, died suddenly at his residence in Victoria, B.C., on February 19. Born in Forrest, Ont., 66 years ago, he received his education at London, Ont., graduating from Western University. After practising in Ontario for three years he became assistant superintendent of Homewood Sanatorium, Guelph. In 1920 he took up his duties at Selkirk. One of his first efforts was to inaugurate a training school for nurses. In 1931-32 he was vice-president of Manitoba Medical Association, and for many years was a frequent attendant of the meetings of the Winnipeg Medical Society. He retired from his duties in Selkirk Mental Hospital in 1943 to reside on the Pacific coast. He is survived by his widow.



**Dr. Robert Adair Bayne** died at his residence, the Queen Alexandra Sanatorium, London, Ont., on February 26. He was a graduate of the University of Western Ontario of 1933. He is survived by his widow and a son, William, and daughter, Margaret Ann.

**Dr. Charles Edwin Biehn** died suddenly in his sixty-seventh year on February 7 at the Hotel Dieu, Windsor, Ont. He is survived by his widow; two sons, Major J. Telford Biehn who is serving in the R.C.A.M.C. with No. 10 Canadian General Hospital, overseas, and Cpl. Walter C. Biehn, of Georgetown; one daughter Mrs. J. E. Start, and six grandchildren. Dr. S. B. Biehn, of Parry Sound, is a brother.

**Dr. John H. Clemens.** A well known native of Port Elgin, Rev. Clemens, a Methodist minister for 52 years before his retirement in 1941, died on February 21 at the home of his daughter, Mrs. A. Budrowe, Williamsville, N.Y. He was 80 years of age and passed away after a brief illness.

Born in Port Elgin, Ont., Dr. Clemens received his early theological training in Canada. He went to the U.S. in 1892 and a short time later was ordained by the Erie Conference. He subsequently held pastorates in Lincoln, Neb., and returned east in 1927 to serve in Oil City, Pa. A few years later he was appointed superintendent of the Meadville (Pa.) District.

In 1936 he became minister of Grace Methodist Church, Warren, Pa., remaining there until his retirement in 1941. Six months ago he went to Williamsville to live with his daughter. Besides Mrs. Howe, he is survived by his widow, a son, John W. Clemens, of Lincoln, Neb.

He was buried at Warren, Pa.

**Dr. Ernest Welland Gemmill** died on February 10 at the age of 79. Since August last he suffered from secondary carcinoma in the spine.

Dr. Gemmill was born near Renfrew, the son of John Gemmill. He was educated in Almonte Collegiate Institute and graduated M.D., C.M. from McGill University in 1889. From 1890 to 1919 he practised in Pakenham, Ont., and then came to Toronto. He was active until compelled to retire. In his younger days Dr. Gemmill was a cricketer and curler. He was also deeply interested in church work and was largely responsible for the erection of the parish hall of St. Aidan's.

Dr. Gemmill became a Fellow of the Toronto Academy of Medicine in 1920. He kept himself abreast with the times and was well known among his senior colleagues as a sound practitioner.

He is survived by his widow, two sons and a daughter.

**Dr. Robert Fullerton Greer**, retired physician and surgeon, died on February 18.

He carried on his practice at Hastings and Carroll for approximately 40 years and retired in 1940.

A medical officer in the last war, Dr. Greer was a member of the I.O.O.F.

He leaves one daughter, Mrs. J. A. McKee, of Seattle.

**Dr. A. E. Henry.** The death occurred recently at Regina, Sask., of Dr. Henry, who was well known in this district a number of years ago. A son of the late Mr. and Mrs. Andrew Henry, he was born on the family homestead in Mono township in 1867, and after graduating as a physician practised for several years at Bognor, later going to Ignace, Ont., and Estevan, Sask., and has been living in Regina for some years. He served in the Canadian Army Medical Corps in the first world war. He is survived by his widow, the former Miss Annie Young, of Owen Sound, a son, Heber, of Winnipeg, and a daughter, Helen, in Regina.

**Dr. William Lewis Colquhoun MacBeth**, aged 59, former medical practitioner in Parkdale, Toronto, died on March 1, at El Monte, Cal., where he had been a resident since 1926. Dr. MacBeth saw service overseas in the first war with the Canadian Army Medical Corps and with the first Canadian Hospital Unit in France, and held the rank of captain.

Born in Medonte Township, Simcoe County, he received his education at Parkdale Collegiate and the University of Toronto, graduating in arts in 1907 and in medicine in 1909. He established a practice in Parkdale, continuing until enlisting with the R.C.A.M.C. in 1914. After two years overseas he returned to Canada and was officer commanding the hospital at Camp Borden, and also served with the British Recruiting Mission in the United States at New York, Cleveland and Chicago. After demobilization he resumed his practice in Parkdale, moving 19 years ago to California, where he continued active in medical practice.

Surviving are his widow, Alice Mack Palmer MacBeth; a daughter and three sons. His son-in-law and three sons are all on active service overseas with the armed forces. Surviving also are two sisters, Mrs. F. A. Gaby and Mrs. E. M. Harman, and a brother, John C. M. MacBeth, K.C., all of Toronto.

**Dr. John Bradshaw McKenzie** died at his home in Newcastle, N.B., February 11, at the age of 67 years. He received his B.A. degree from Dalhousie University and graduated in medicine from McGill in 1902. He had practised continuously on the North Shore of New Brunswick, first at Loggieville and later at Newcastle.

He was a Fellow of the American College of Surgeons and a Fellow of the Royal College of Surgeons of Canada. He was a past president of the New Brunswick Medical Society.

Dr. McKenzie was about the last of a group of great rural surgeons who served the smaller towns and country side of New Brunswick in the past four decades. They were outstanding craftsmen, known widely for the excellence of their surgery, which they supported by a keen diagnostic ability and a surpassing love of human kind. Distinguished personalities were welded to life-long efforts to help their neighbours and patients and their Province is proud of their sons who were proud to be country doctors. Their passing is a challenge to those who will replace them. Dr. McKenzie is survived by his widow and one son, Lieut. Robert McKenzie, R.C.N.V.R., and two daughters, Nursing Sister Muriel McKenzie, R.C.N., and Mrs. Wm. A. Corbett of the teaching staff of Hartland High School.

A. S. KIRKLAND

**Dr. Thomas H. MacKinnon**, a prominent physician and surgeon of Brooklyn, New York, died February 10, following a serious operation a few weeks ago.

Dr. MacKinnon attended to his practice up to the time of entering the Long Island College Hospital.

Dr. MacKinnon was born at Parrsboro, son of the late Rev. Duncan MacKinnon, of Lockeport. He has many relatives and friends in Nova Scotia, as well as his many patients and friends in Brooklyn, N.Y., by whom he was much beloved.

He is survived by his widow, one son, Donald, overseas in the American Army; one daughter, Mrs. Drayton Belknap, of New York, and four sisters, Mrs. W. F. Kehoe and Mrs. (Dr.) Munroe, both of Winnipeg, Man.; Mrs. Frank Bill, of North Sydney, and Mrs. Frank Forsyth, of Greenwich, Nova Scotia.

**Dr. Robert Clement Ernest Magee** died in the Winnipeg General Hospital on February 13 at the age of 69. Born at Ottawa, Ont., he received the Bachelor of Arts degree from McMaster University in 1901 and came to Manitou. In 1906 he graduated from Manitoba Medical College. After practising at Napinka and Pipestone, he took postgraduate work in 1921 in New York. On his return he practised in Winnipeg

as an eye, ear, nose and throat specialist. From 1922 to 1936 he was a member of the honorary attending staff of the Winnipeg General Hospital and from 1923 to 1933 lecturer in otology in the Faculty of Medicine, University of Manitoba. He is survived by his widow, a daughter, Mrs. (Dr.) R. G. Greer, a son, now a student in medicine, and two brothers, one of whom is Dr. Ross Magee, of New York.

**Dr. W. R. Newman**, recently with the R.C.A.M.C., died suddenly in Toronto on February 11 in his 53rd year. He was born in Castleton, Ont., and on coming to Toronto attended Harbord Collegiate and the University of Toronto Medical School.

He graduated in 1916 and practised medicine in Toronto until joining the Canadian Army Medical Corps in 1942. He served in the corps for 18 months, and on receiving his honourable discharge, he resumed his practice. Dr. Newman is survived by his widow, his daughter, Mrs. Donald Richards, and his son, Donald.

**Dr. Stanley Earl Patterson**, M.D. Man. 1928, a brother of Dr. Walter Patterson, Holland, Man., died on February 6 at Grand Forks, North Dakota. He was buried at Roland, Man., on February 9.

**Dr. Errol Oliver Shaver**, aged 48, veteran of the first Great War, died on March 1, at Christie Street Hospital, where he had served on the staff for several years. He had been ill for the last five months.

For some years Dr. Shaver engaged in private medical practice in Toronto. Born in Toronto he attended local schools and interrupted his course at the University of Toronto, during the first war, to enlist. He went overseas with the 67th University Battery, and saw service in France. Returning to Canada, he resumed his studies and graduated in medicine from the University of Toronto in 1924. He gave up his private practice to join the staff at Christie Street Hospital.

Surviving are his widow, Beatrice Armstrong Shaver; a daughter, Beverley; two brothers, Dr. R. C. and George H. Shaver, and two sisters, Mrs. J. J. Dean and Mrs. G. H. Bender, all of Toronto.

## News Items

### Alberta

Again Alberta is to have a refresher course in the University Hospital May 7 to 11. These courses are gaining in appeal to the men of the Province. Colonel Strong of the School of Tropical Medicine, Washington, D.C., will be on the program and Dr. J. R. Fraser, head of the Department of Gynaecology and Obstetrics, of McGill University, will assist and will also deliver the first Conn Memorial lecture.

The program is not complete, but we are to have another outstanding surgeon and an internist from the east. The detailed course will be made available well in advance of the meeting.

The Government is amending the Maternal Hospitalization Act to provide for patients who are a long distance from the nearest Alberta hospital, but who may be accommodated at a near adjacent hospital though not within the Province of Alberta. The hospital will receive the same financial assistance as though it were within the Province.

Dr. Victor W. Wright has resigned as chairman of the Workmen's Compensation Board. The reason why his resignation was handed in is not quite apparent, but for some time the Miners' Union has been demanding the resignation of Dr. Wright and Mr.

Farmillo, the labour representative on the Board. Various injured workmen, so the charge is made, have not received sufficient compensation for their disabilities. It is reported that they have received all and more according to the disability established by the Boards' capable physicians; but they still want more. The matter is somewhat complicated and will doubtless be investigated when matters will be cleared up. The workman no longer pays anything towards the expenses of the Board, industry bearing all the burden.

Congratulations are offered to Dr. W. H. Hill, Medical Health Officer of Calgary, on being elected to the Vice-presidency of the Canadian Public Health Association. G. E. LEARMONTH

### British Columbia

The Osler Dinner of the Vancouver Medical Association was held in the Hotel Vancouver on March 6, 1945, Dr. Howard Spohn being the Osler lecturer. His subject was, "The employment of leisure". An unusually large attendance was present and included many men in uniform. Dr. Spohn gave a very thoughtful address, which was listened to with keen interest.

A feature of the dinner was the presentation of the Degree, Prince of Good Fellows, which was conferred upon Drs. A. J. MacLachlan and G. A. Petrie, amid general acclaim. No men have ever deserved it better.

The following British Columbia students have taken their degrees in Medicine at Queen's University: Kenneth Cecil Boyce, Morris Albert Menzies, Albert William Perry, Geoffrey Charles Robinson and Robert Edward Simpson; whilst Toronto University informs us that P. Bell-Irving, V. J. Freeman, A. J. Kergin and W. K. Lindsay passed their final examinations.

The prospects for the establishment of a Medical Faculty at the University of British Columbia are becoming somewhat brighter with the announcement by Premier Hart at the recent meeting of the Legislature that steps are to be taken in this direction. It is not at the moment clear how far the Government is prepared to go immediately, but it is hoped that this very urgent need will soon be filled.

The explosion on *S.S. Greenhill Park* in the harbour of Vancouver on March 6 filled the hospitals with casualties, and came very near being a national disaster. Some nine men are still missing, and downtown streets of Vancouver were littered with broken glass from thousands of windows. Occurring when it did it is a marvel that more people were not seriously injured.

Lieut.-Col. W. A. Clarke, R.C.A.M.C., who has served as Assistant Command Medical Officer, Pacific Command, for over two and a half years, has now returned to civilian life, and is resuming practice in New Westminster.

Major R. W. Patten, R.C.A.M.C., formerly of Chilliwack, has returned from service overseas.

J. H. MACDERMOT

### Manitoba

Lieut.-Col. J. C. R. Edwards, of Newmarket, Ont., has taken over command of Fort Osborne Military Hospital in succession to Lieut.-Col. W. M. Musgrove, who has become district medical officer, M.D. 10. Lieut.-Col. Edwards was a surgeon with the British Navy during the last war and was recently senior medical officer at Camp Borden.



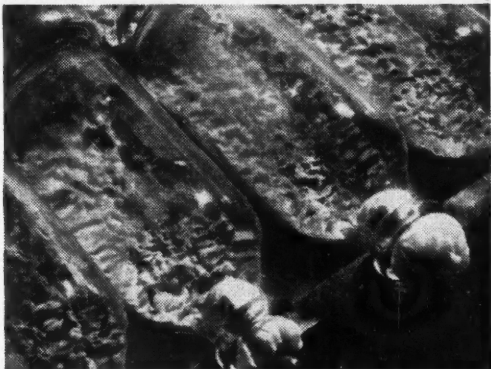
# AYERST PENICILLIN



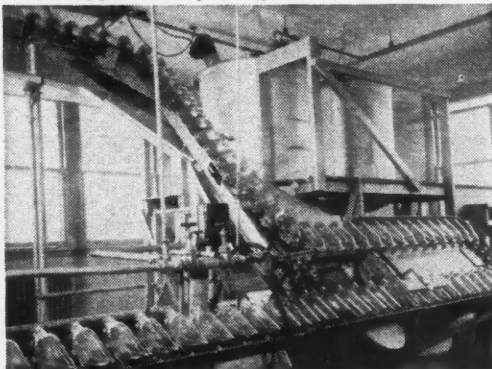
The sterile culture medium is inoculated with a suspension of *Penicillium notatum* spores by one of the Ayerst technicians.



Section of one of the incubator rooms in which the culture bottles, following inoculation, are placed and remain approximately 7 days.



Bottles ready for "harvesting" showing the leathery-looking mould thallus or "mat".



Harvesting, bottle washing and refilling with culture medium are done mechanically on this conveyor system.



After sterilization by filtration, testing and standardization, the Sodium Penicillin solution is then filled into sterile bottles.



Following complete retesting for potency, sterility and moisture content, Ayerst Penicillin is packaged and released for sale.

## NOW AVAILABLE





The R.C.A.F. Nutrition Laboratory in the Manitoba Medical College has become the property of the people of Manitoba. The laboratory was originally to be discontinued at the end of 1944, but through Premier Garson's intervention it was agreed that its work should be carried on. The R.C.A.F. staff will continue to operate the laboratory under the direction of the university. Provincial authorities hope that some arrangement between the Federal government and the provinces can be made whereby all the R.C.A.F. laboratories in Canada will be able to continue on a nation-wide basis.

Major Stanley Kobrinsky, R.C.A.M.C., after four years' service overseas, has resumed practice at 505 Boyd Bldg., Winnipeg.

At the 34th annual meeting of the Sanatorium Board of Manitoba on February 16, Dr. E. L. Ross, Superintendent of Manitoba Sanatorium, reported that in the year's work there had been a total of 59,420 x-ray examinations. Of this total 11,332 were at stationary clinics, 4,765 at travelling clinics, and 43,323 on surveys in Winnipeg and elsewhere. Routine x-raying of recruits for the armed forces discovered 32 new cases. Enlisted men on treatment in the various tuberculosis institutions numbered 48 at the end of the year. The total bed capacity for tuberculosis patients is 750. It is the opinion of Dr. D. L. Scott, assistant superintendent, that doctors in private practice are the best case finders.

Capt. Maxwell Lerner, R.C.A.M.C., of Winnipeg, has been awarded the Military Cross for gallantry in action in Italy. He joined the R.C.A.M.C. in July, 1942, and went overseas a year later serving for a time as M.O. of the Hastings and Prince Edward regiment.

Dr. P. H. T. Thorlakson has been elected chairman of the newly formed western regional group of the associate committee for medical research. The group was created by the National Research Council.

Dr. Charles Code, a Manitoba graduate, of the Mayo Clinic, Rochester, addressed the Scientific Club of Winnipeg on February 13 on the subject: "A physiologic interpretation of blackout as it occurs in aviators". He was introduced by Professor A. T. Cameron.

Capt. Harry Marantz, R.C.A.M.C., medical officer of the Queen's Own Cameron Highlanders, who was killed in action August 15, 1944, has been mentioned in despatches posthumously.

Capt. Joseph C. Portnuff, R.C.A.M.C., of Winnipeg, has been awarded the Military Cross for gallantry in action in the Italian theatre of war.

ROSS MITCHELL

### New Brunswick

Dr. Geo. W. A. Keddy, of Saint John, has been promoted to the rank of Major in the R.C.A.M.C. overseas and has been transferred from a General Hospital in Belgium to a Canadian General Hospital in England as a surgical specialist. Major Keddy has been overseas since 1942.

Dr. Walter W. White, of Saint John, has been re-elected president of the Saint John General Hospital Board of Commissioners at the annual meeting in January.

In a recent reorganization of the N.B. Branch of the McGill Graduates Association the slate of officers include: Dr. A. E. Macaulay, Pres.; Dr. Geo. M. White, Sec.; Drs. E. A. Petrie, Geo. Lyons, H. S. Everett, V. Snow and J. J. MacPherson, executive members representing the Medical Graduates of McGill.

Dr. L. DeV. Chipman was re-elected President of the New Brunswick Branch of the Red Cross Association at their annual meeting at the year's end.

Military authorities recently announced that Dr. H. P. Melanson, of Moncton, and Dr. J. F. L. Brown, of Woodstock, had been discharged from the R.C.A.M.C. These doctors are again in private practice.

Dr. P. C. Laporte, M.B.E., of Edmundston, president of the N.B. Medical Society has appointed a committee to implement a plan to provide some form of personal memorial to the doctors from New Brunswick serving in the active forces of the country.

Lately there has appeared a series of articles in a Montreal paper, *The Standard*, containing certain allegations concerning the Provincial Hospital at Fairville, N.B. These articles have criticized generally the conditions existing in that institution. Dr. F. A. McGrand, Minister of Health in the Government of N.B. has appointed a very strong Royal Commission to investigate the allegations appearing in *The Standard*. The investigation will be conducted under the provision of the Enquiry Act and the Commission will report to the provincial secretary treasurer. The three man commission consists of Hon. J. B. M. Baxter, Chief Justice of the Province; Rev. L. M. Pepperdine, Rector of St. Luke's Anglican Church in Saint John and Judge of the Juvenile Court of Saint John and Mr. E. B. Sweeney, Manager of the Admiral Beatty Hotel, Saint John and Chairman of the Executive Committee of the Board of the Commissioners of the Saint John General Hospital. The scope of the investigation by this Commission as defined in the order in council is very wide and should satisfy all concerned.

A. S. KIRKLAND

### Nova Scotia

Dr. Henry A. Myers, formerly of Moncton, has returned to Canada and is opening a practice in Amherst.

Dr. J. A. Donahoe, who for the past several years practised in Shelburne, has turned over his work to Dr. Murray MacDonald, formerly of Port Dufferin, and will in future be located at Truro.

Dr. H. W. Schwartz, Halifax, who has recently been a patient in the Neurological Institute in Montreal, is convalescing at Marshlands, Sackville, N.B.

A report on the Dartmouth Hospital situation, conducted under the auspices of the Kellogg Foundation, has resulted in a report recommending the foundation of the hospital which, besides caring for the general hospital case, will serve as a community health centre for the Town of Dartmouth and the large country district eastward.

Dr. Jane L. Bell was recently appointed president of the Halifax Bureau of Social Agencies.

Among those who returned to Canada recently after long periods of overseas duty was Lieut.-Col. T. M. Sieniewicz, who in civil life is superintendent of the Morris Street Tuberculosis Hospital. Lieut.-Col. Sieniewicz, who has been O.C. of medicine with No. 7 Canadian General Hospital, a Nova Scotian unit, for the past 3½ years, has been posted to the staff of the district medical officer, M.D., No. 6, at Halifax.

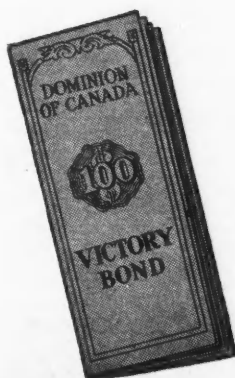
He served with the hospital unit in England, France, and Belgium. Previous to becoming attached to his unit he was M.O. of the Princess Louise Fusiliers with which he was called up on the outbreak of war.

Lieut.-Col. Sieniewicz, who recently was awarded the Canadian Efficiency Decoration, is leaving to spend a few days in New Brunswick visiting his children before assuming his new duties. His daughter Barbara is a member of the laboratory staff of the New Bruns-

# logistics ...



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wick Department of Health, and his son James is a student at the University of New Brunswick.

Col. Victor O. Mader is O.C. of No. 7 Canadian General Hospital.  
H. L. SCAMMELL

### Ontario

Lieut.-Col. Jas. W. Ross who has been in charge of surgery in Camp Borden since the beginning of the war, has been transferred to Toronto Military Hospital, Chorley Park, Toronto, to succeed Lieut.-Col. Brennan. Lieut.-Col. Brennan is retiring from the army and will resume his work on the surgical staff of St. Michael's Hospital. Lieut.-Col. Bastedo after a long service overseas succeeds Lieut.-Col. Ross.

London Academy of Medicine held its meeting on February 1 in Victoria Hospital. The program was provided by the hospital staff. The meeting on February 21 was held in St. Joseph's Hospital. Interesting cases associated with clinical problems were presented by members of the hospital staff.

A convocation of the University of Toronto was held on February 16. The Chancellor, Hon. Dr. Cody, admitted 116 graduates to the degree of Doctor of Medicine. Four of the group graduated with honours. One hundred and three of the men and eight of the eleven women in the class were dressed in military uniform instead of the conventional academic gown. Amongst these was Lady Banting, widow of the late Sir Frederick Banting.

Dr. Chester M. Jones, Clinical Professor of Medicine, Harvard Medical School addressed the Academy of Medicine, Toronto, on February 6. His subject was "Unusual variations in thoracic and abdominal pain as manifestations of digestive tract disturbances". Osler Hall was crowded by an enthusiastic audience.

Dr. Geo. Young has been elected to the Presidency of the Æsculapian Club of Toronto for the coming year. Dr. E. C. Cooper Cole is to be Vice-president.

The Academy of Medicine, Toronto, has set up a Rehabilitation Committee. A list is published in each issue of the *Bulletin* of medical officers who have returned to civil life and wish to resume their practices. The natural decency of the practitioners who attended patients of these men during their term of service is depended upon to ensure that such patients will be sent back to their original attendants.

Dr. Gerard Latour, of Ottawa, has taken over the medical practice of Dr. B. Primeau at Alexandria, Ont. Dr. Latour after graduating from the Ottawa elementary schools and obtaining his Bachelor of Arts from Ottawa University studied medicine at Laval University of Quebec from which institute he received his degree with honours.

He served with the Royal Canadian Army Medical Corps, and the Royal Canadian Navy Medical Corps. On being released from military duty he went to Sacred Heart Hospital in Hull as resident physician.

M. H. V. CAMERON

Dr. Geo. E. Verity has resumed his practice in eye, ear, nose and throat specialty at Brantford. He has been in the Royal Canadian Navy for the last four and a half years.

Major John R. Calder, who was medical conducting officer aboard ships carrying sick and wounded Canadians from Britain to Canada across the sub-infested Atlantic in 1940, has resumed his medical practice in Brantford. He was on active service for more than four years with the R.C.A.M.C.

### Prince Edward Island

Dr. Simpson, Summerside, has made a satisfactory recovery following an emergency appendectomy last month.

Dr. I. J. Yeo, Charlottetown, Treasurer of Prince Edward Island Medical Society, has resumed active practice following a month of illness.

Dr. W. J. P. MacMillan, O.B.E., Charlottetown, attended the meeting of the Executive Committee of the Canadian Medical Association held in Ottawa, March 4 and 5.

At the annual meeting of the Prince Edward Island Division of the Canadian Red Cross Society Dr. MacMillan was again elected President. It was a most successful year. The work accomplished and the generous response in the raising of funds to carry on its work was most encouraging. Dr. A. J. Murchison serves as a member of the Executive.

It is with regret that we report the serious illness of Dr. P. A. Creelman, Medical Superintendent of the Provincial Sanatorium. Dr. Creelman has been ill for the past month, and is now reported to be steadily improving. His many friends are wishing him a speedy recovery.

Capt. Stewart Woolner, Rustico, P.E.I., is serving with the 4th Canadian Field Ambulance, which has been active on the battlefield of Italy since July, 1943.

Surg.-Lieut. E. I. Giddings, Charlottetown, who is attached to the Sea Cadet Corps "Kent" as Medical Officer, has taken a two weeks' course of special training for Sea Cadet Officers, which was held at the *H.M.C.S. Cornwallis* near Digby, N.S. This naval training centre is the largest in the British Empire.

The Provincial Government has appointed a Reconstruction Committee to act as advisers to the Government on reconstruction problems. Serving on the committee for Health and Public Welfare are: Dr. J. P. Lantz, Charlottetown, Chairman; Dr. J. A. MacMillan, Charlottetown; Dr. J. F. McNeil, Summerside; Dr. A. J. Murchison, Charlottetown.

The Annual Convention of the Maritime Hospital Association meets in Charlottetown June 19, 20, 21 and 22; Dr. R. J. Collins, Saint John, is the President and Dr. J. A. MacMillan, Charlottetown, is the Vice-president.

Three doctors from Charlottetown are serving with No. 7 Canadian General Hospital somewhere in Belgium: Lieut.-Col. Donald Campbell of the Polyclinic Staff, Charlottetown; Dr. Campbell is the C.O. in charge of surgery. Major G. G. Houston also of the Polyclinic Staff, Charlottetown, specializing in eye, ear, nose and throat work; and Major J. H. Shaw, formerly Assistant Medical Superintendent at the Provincial Sanatorium. Previous to going overseas Dr. Shaw had specialized in pathology and bacteriology. These doctors have been overseas since November, 1941.

Also serving in this hospital are twelve nurses from Prince Edward Island.

Dr. W. B. Howatt, Summerside, spent the month of March in New York, where he was taking a post-graduate course in radiology.

Dr. H. A. Pierce, Charlottetown, spent a few weeks in February visiting friends in Ohio.

The Government of Prince Edward Island has recently announced the appointment of Dr. B. C. Keep-



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# AT THE *Menopause*

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ing, Deputy Minister of Public Health, and Dr. E. M. Found, assistant medical superintendent of the Provincial Sanatorium, as Justices of the Peace.

Hon. W. J. P. MacMillan, M.D., O.B.E., Charlottetown, Leader of the Opposition in the Provincial Legislature, was in Ottawa the first week in March attending an Executive Meeting of the Canadian Medical Association and the annual meeting of the Progressive Conservative National Association.

Dr. J. C. Simpson, Summerside, is a member of the Provincial Committee for the Benevolent Fund of the Royal Canadian Air Force.

Dr. J. P. Lantz of the Polyclinic, Charlottetown, was confined to his home during the first two weeks of March, due to a severe cold.

The marriage of Dr. I. Rachmel, Charlottetown, was recently solemnized in Montreal, the bride being Miss Dorothy Davy, of Charlottetown.

The marriage of Surg.-Lieut. W. W. Tidmarsh, of Charlottetown, now residing in Halifax, took place in Montreal on March 3, to Miss Meryl Clark, of Winnipeg. Surg.-Lieut. Tidmarsh is a son of Dr. F. W. Tidmarsh, Charlottetown.

The West Prince Hospital at Alberton, recently opened, was formerly the Albion Terrace Hotel, which has been refitted as an up-to-date Hospital. Modern equipment has been installed and an experienced nursing staff secured. At present the hospital only accepts medical, maternity and emergency patients. In the spring a new wing is being built, which will include a modern operating room. This hospital now has a capacity of fifteen beds.

A. J. MURCHISON

### Quebec

Colonel L. C. Montgomery, M.C., has returned to Canada, and is expected soon to resume his McGill University post as professor of medicine and head of the department of medicine at the Montreal General Hospital.

Col. John H. Palmer, R.C.A.M.C., late of the staff of the Royal Victoria Hospital, Montreal, has been appointed medical consultant to the Canadian Army Overseas, succeeding Colonel L. C. Montgomery who has returned to Montreal. Colonel Palmer had previously been consultant to the Canadian Army in Italy.

L'Hon. J. H. A. Paquette, ministre de la Santé et du Bien-être social, a été élu président honoraire de la Société médicale de Montreal.

La Société de physiologie de Montréal a élu l'exécutif suivant: Président, Dr J. E. Marion; vice-président, Dr Léo Ladouceur; secrétaire-général, Dr J. P. Paquette; trésorier, Dr M. Vershelden, et secrétaire des séances, Dr J. L. Pilon.

L'hôpital Ste-Justine a élu les médecins suivants à l'exécutif du Bureau médical et du Conseil médical: Bureau médical: Président, Dr P. Gauthier; Secrétaire, Dr H. Trudel. Conseil médical: Drs A. Z. Crépault, G. Lapierre, H. Baril, P. Joly et W. Major.

JEAN SAUCIER

Lieut.-Col. J. P. Laplante, O.B.E., of Granby, who has been on active service for the last four and a half years returned from overseas in February.

### Saskatchewan

Dr. G. Bicum, who has been with the R.C.A.F. since January, 1942, has resumed civilian practice at Elstow, Sask. Dr. E. W. Spencer, recently discharged after being with the R.C.A.M.C. since July, 1940, has been appointed Acting Director of the Saskatoon Cancer Clinic.

New registrants in February were Dr. John P. F. McManus, M.D. Queen's 1937, located at Langenburg, Sask., and Dr. Melvin W. Bowering, M.D. Manitoba 1938, who was recently released from active service, is residing in Regina.

Dr. J. V. Millions, formerly of Kincaid, Sask., has located at Eastend, Sask., and Dr. C. B. Stone has left Arcola to locate at Grenfell, Sask.

Recently returned from overseas, Brig. E. A. McCusker, C.B.E., M.C., E.D., will resume practice with Drs. E. A. Graham and H. M. Haughton, eye, ear, nose and throat specialists, McCallum-Hill building. Brig. McCusker returned to Regina December 31 after having served as deputy director of medical service with the 1st Canadian Corps in Italy. He was taken on strength of the active army with the rank of lieutenant-colonel, October 17, 1939, and went overseas December 9 of the same year. In the first Great War he went overseas with the C.E.F., served four years and won the Military Cross for gallantry in action. Dr. McCusker began his practice in Regina in 1923. He was joined by Dr. Graham about 10 years ago and by Dr. Haughton in 1936.

H. D. HART

### General

**Price Cut Announced for Civilian Penicillin.**—A reduction in the price of penicillin to Canadian hospitals for civilian use is announced by Chemicals Controller E. T. Sterne. The new price will be \$2.85 per ampoule as from February 1.

Originally penicillin sold for \$6.05 per ampoule and recent prices have been \$3.50. The price as now announced will be on a parity with those in the United States.

Mr. Sterne said the lowered price follows a reduction in the selling price by the Canadian commercial manufacturer of penicillin (Merck & Co.) which at present is supplying the entire civilian market. Increased production and improved manufacturing methods permitted the reduction.

The entire output of two government-owned penicillin plants is absorbed by purchases by the Munitions Department for the armed services.

(Plans for postwar manufacturing expansion of Merck & Co. Limited were announced at the recent annual meeting of the shareholders. The Managing Director, R. I. Hendershott, stated that the company is rapidly outgrowing its present plant facilities and that a tract of 210 acres has been purchased at Valleyfield, Que. This site was chosen because of its proximity to adequate power, water, and transportation facilities and the favourable labour situation in the community.)

The company's penicillin plant was the first in the British Empire to use the deep fermentation method on a commercial scale and it was constructed and put into operation in the record time of six weeks.)

### United States Army Notes

**Risk of Infantile Paralysis no Greater in Army Than in Civilian Life.**—Despite the huge concentration of men brought together from all parts of the country in Army posts and the combat conditions under which great numbers are living, there is apparently no more danger in the Army from infantile paralysis than there is in civilian life.

Your patient had a set-back, eh?  
Ain't that a low-down shame!  
I hid in your solution jar —  
PETE PYROGEN'S my name.  
You'd best insist on SAFTIFLASKS  
To beat my clever game!



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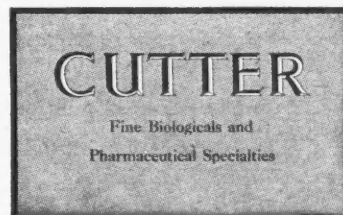
**For economy, too** — you'll insist on Saftiflasks. Hospital

superintendents who know their cost accounting know that Saftiflasks beat the high cost of overhead. "Mixing your own" has lost its allure!

**For convenience, certainly!** Simple equipment, like Cutter Saftiflasks, gives you extra protection now when staffs are short or inexperienced. No

tricky parts to wash, sterilize, or break down in use.

Get all the benefits of Saftiflasks—*starting at once!*



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The office of the Surgeon General reports that the number of cases was 3.4 per 100,000 troops in this country in 1943 and 4.0 in 1944. The case fatality rate was 12.1% in 1943. This is similar to the civilian rate for similar ages, and there is a further similarity in the time of year the cases occurred and their geographical location.

There has not been an epidemic of infantile paralysis at any Army post during this war.

**Army Training Reconditioning Instructors.**—The Army now has 680 officers and 1,486 enlisted men who are graduates of training courses in physical and educational reconditioning. More are constantly being trained—not only to take care of the increasing number of convalescents in Army hospitals, but to replace those instructors called to general duty.

Because able-bodied instructors in educational reconditioning are subject to reassignment at any time, every effort is being made to fill these posts from the Army rôles of physically disabled. According to the office of the Surgeon General, these handicapped instructors—many of whom have suffered amputations—are particularly inspiring to the convalescent soldiers they instruct.

**Need Now is for 16,000 Nurses.**—The Army needs 16,000 additional nurses immediately in order to care adequately for wounded and sick American soldiers, according to Major General George F. Lull, Deputy Surgeon General.

During the first two weeks of February, 1,450 registered nurses received commissions as officers in the Army Nurse Corps. This is an increase over the 1,050 commissioned in January, but the total number of nurses is still far short of the Army's immediate needs.

With the flood of new patients from overseas, the authorized ceiling for the Corps was recently raised from 50,000 to 60,000. At present it numbers only 44,000 and about 250 nurses a month are separated from the Army for various reasons. About 71% are overseas, some having been in foreign theatres for several years. Incidentally, a more effective rotation plan for these over-worked nurses will be possible when the full quota of 60,000 is reached.

**Women Medical Officers.**—There are currently 74 women medical officers serving in the Army, according to the office of the Surgeon General. Of this number four are majors, 36 are captains and 34 are first lieutenants. They have been certified as internists, neuropsychiatrists, obstetricians, gynecologists, pathologists, radiologists and anæsthetists, and the Army has given them assignments in line with their specialties at general, regional and station hospitals as well as at the two W.A.C. training centres. Seventeen of these women medical officers are now serving overseas.

**Inter-American Congress of Radiology.**—We wish to extend our most cordial invitation to all radiologists of Canada to attend the Second Inter-American Congress of Radiology which will take place in Havana, Cuba, from January 19 to 24, 1946.

We hope to have as many representatives as possible from your country. In this Congress we will definitely organize the Inter-American College of Radiology which we know will do much towards improving both scientific and personal relations among American radiologists.

The program will be divided into three principal parts, namely: four official lectures, scientific sessions where free subjects on radiology may be presented, and an extensive scientific exhibit.

For further information, write the Havana office of the Second Inter-American Congress of Radiology, Calle 23 No. 411, Vedado, Habana, Cuba.

**The Pan-American Congress of Ophthalmology** will be held in Montevideo on November 25 to 30, 1945. Further details will be published later.

**Anæsthesia Essay Contest.**—A prize of \$100 is offered by the American Society of Anæsthetists, Inc., for the best original essay on some phase of anæsthesiology or on a subject closely related to it.

The contest is open in postgraduate medical students in anæsthesiology anywhere and also to postgraduate medical students in other specialties who have devoted some of their time to anæsthesiology or to some phase of clinical or experimental work related to anæsthesiology.

All manuscripts must be in the hands of the Secretary of the American Society of Anæsthetists, Inc., before October 1, 1945.

Rules of the contest and other relevant information may be obtained by writing to R. Charles Adams, M.D., Chairman of the Committee on Awards and Honours of the American Society of Anæsthetists, Inc., Mayo Clinic, Rochester, Minnesota; Wesley Bourne, M.D., Department of Pharmacology, McGill University, Montreal; or to McKinnie L. Phelps, M.D., Secretary of the American Society of Anæsthetists, Inc., 745 Fifth Avenue, Room 1503, New York 22, N.Y.

## Book Reviews

**Manual of Military Neuropsychiatry.** Edited by H. C. Solomon and P. I. Yakovlev. 764 pp., illust. \$7.00. Saunders, Phila.; McAinsh, Toronto, 1944.

The editors of this manual have succeeded in compiling in one portable volume a surprisingly detailed compendium of both military psychiatry and of the essentials of neurology and psychiatry of use to medical officers. The book is a symposium by many authorities engaged in various aspects of military neuropsychiatry in the United States.

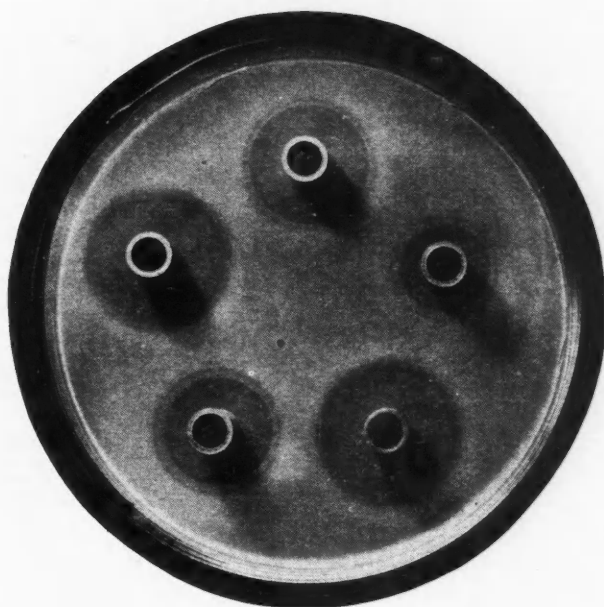
Since the book is *not* entitled "Manual of United States Military Neuropsychiatry", one is struck by the fact that only 16 out of the 764 pages are devoted to experiences from "foreign armies". Of particular concern to us is the absence of any reference to the Canadian system of army psychiatry even though our system has been commended from time to time for its special merits by competent United States and British authorities. However, one also searches in vain for any contribution from the present chief consultant in psychiatry in the Surgeon-General's office in Washington as well as from other United States psychiatrists who have recently been making outstanding military contributions. In fact one gets the impression that the volume as a whole lags behind the main stream of military psychiatry although individual contributions to the manual are well up to date. This situation may be the result of editing by individuals not fully immersed in that stream or merely from the difficulties resultant from the swiftness of movement of the stream.

The neurological chapters seem particularly well done and, if there were added a few of the conditions less common in a military group, these chapters might themselves constitute a useful handbook for American Neurology. Many of the individual chapters on psychiatric subjects are also very worthwhile reading and there is no doubt that the volume, whatever its imperfections, provides a source of information, and even inspiration, for those physicians for whom it is intended.

# PENICILLIN

## METHOD OF ASSAY

The original plate method of N. G. Heatley, colleague of Sir Howard Florey, is used in the Connaught Laboratories for the final measurements of potency. The illustration shows the striking action of penicillin in inhibiting bacterial growth, and indicates the method by which the strength of the penicillin solution to be tested is determined in terms of a standard solution.



In the assay of penicillin, an agar plate is seeded with a culture of *Staphylococcus aureus*, and cylinders set in the plate are filled with various dilutions of penicillin. The clear zones surrounding the cylinders are the areas where penicillin has inhibited bacterial growth, and potency is determined by measuring these areas.

**Penicillin of high quality is NOW AVAILABLE in vials of  
100,000 Oxford units.**

Sterile saline solution for preparing penicillin  
is supplied in 20-cc. vials.

**CONNAUGHT LABORATORIES**  
University of Toronto                      Toronto 5, Canada

**Textbook of Pathology.** R. A. Moore, Professor of Pathology, Washington University School of Medicine, Saint Louis. 1338 pp., illust. \$11.50. Saunders, Phila.; McAinsh, Toronto, 1944.

In the opinion of the reviewer this new book is a definite addition to the current supply of good textbooks of pathology. In arrangement it continues the present division of the subject into general and special pathology, which has been found in most medical schools to be very suitable for the teaching in the pre-clinical and clinical years. There are, however, important changes which seem to be distinct improvements. As is well recognized, the most desirable classifications of diseases are based as far as possible on cause and toward this there has been more and more teaching of recent years. Dr. Moore continues and amplifies this conception. In addition the rôle of pathological biochemistry and physiology is stressed, as for example in the impression of the significance of the metabolic changes underlying disease processes.

The text is extremely well illustrated, a few well chosen coloured plates being very effective. The pictures, of which there are an extremely large number, are nearly all original, with also a few well known excellent plates from MacCallum.

The bibliography at the end of each chapter is good and complete, a worthwhile innovation being the listing where applicable of medical journals especially pertaining to the subjects discussed above.

This is a very readable book, the subject material is up-to-date, clearly and also concisely handled. There has been some modification of the order from that in which some of the disease processes have heretofore been discussed, this with the idea, as noted above, of linking causes more closely with group conditions and the rearrangement appears to have been justified.

**Neurology of the Eye, Ear, Nose and Throat.** E. A. Spiegel, Professor of Experimental and Applied Neurology, Temple University School of Medicine, and I. Sommer, Lecturer in Ophthalmology, Long Island College of Medicine. 667 pp., illust. \$7.50. Grune and Stratton, New York, 1944.

This book is an excellent concentrated portrayal of the neurological aspects of disease of the eye, ear nose and throat. It contains a requisite study of primary anatomy and physiology with results of later experimental work. Methods of examination are evaluated; clinical studies are full, with extensive differential diagnostic comment; pathology is fully discussed, and treatment is concise but adequate.

This treatise apparently emanates from the continued studies and lecture material of many years. It attempts to bridge the gap between the primary sense organs and the central nervous system in health and disease. It is amply illustrated.

The appearance of this book should be welcomed, both as a handy reference and also a full text, for the practitioner. It is also of great value to the research worker and the senior student.

**Principles and Practice of Surgery.** W. W. Babcock, Emeritus Professor of Surgery, Temple University; Acting Consultant, Philadelphia General Hospital. 1331 pp., illust. \$13.75. Lea & Febiger, Phila.; Macmillan, Toronto, 1944.

A review of this excellent book must be in general terms as it covers every field of surgery. This covering is, in the reviewer's opinion, thoroughly made and the result is a volume that will be welcomed by teachers and students. The general practitioner will find it up to date and quite free from the lumber so often carried forward from older texts. The illustrations are well chosen and beautifully executed. The index is exhaustive.

The book is divided into four sections. Eleven chapters are given to general surgery, nine to surgical technique, ten to the surgery of systems and thirty-seven to regional surgery. Although the book has

been in preparation for 3½ years, the epochal advances during that time have all been included so that the use of penicillin and aseptic pressure in the treatment of burns are presented as though in a current journal. The recognition of the Rh factor in transfusions of blood and the use of plasma and other replacement fluids are discussed as well as the new thrombins containing media in nerve suture and hæmostasis. The advantages of using suture material that causes minimal reaction in the tissues is stressed and the planning of incisions is logically correlated with the natural lines of cleavage of the skin.

The book is easy to read. The style is lucid and direct and the editing has been done perfectly so that there is no impression of reading a series of monographs and there is no overlapping. The work is worthy of full commendation and a large distribution.

**A Pathology of the Eye.** E. Wolff. 2nd ed., 286 pp., illust. £2. 2. 0. Lewis, London, 1944.

This is the second edition of a very popular and most useful volume on the pathology of the eye. Some changes have been introduced. The book has been produced in a more compact form by reducing the cover size and increasing the number of pages. The original volume was planned as a link between pathology and clinical ophthalmology and included a large amount of clinical material; and admirably filled the niche for which it was intended. The present volume has been enlarged to include more detail on the pathological and histological changes associated with ocular disease. It therefore becomes a more valuable volume. It is profusely illustrated and the text is lucid and concise. This is a most valuable standard textbook for the postgraduate student in ophthalmology.

**Textbook of Gynecology.** E. Novak. 2nd ed., 708 pp., illust. \$8.00. Williams and Wilkins, Baltimore, 1944.

This new textbook on gynecology is especially written for the undergraduate student. The knowledge conferred has been gained by practical teaching of the subject for many years. The author is well known from his previous writings, and has the power of simplifying other writers' ideas. His chapter on embryology of the female genital tract is simply a review of Robert Meyer's work on the development of the vagina. The chapter on endocrine gynecology is also a summary of previous work done. The chapter on sterility and method of treatment is very clear, and is a new chapter for the student. The general pathology is well illustrated by clear photographs, and the diagrams are well described.

The book is warmly recommended to our graduating students because of the clear diction and up-to-date presentation of each chapter.

**Modern Clinical Syphilology, Diagnosis, Treatment, Case Study.** J. H. Stokes, Professor of Dermatology, School of Medicine and Graduate School of Medicine, University of Pennsylvania, and others. 3rd ed., reset, 1332 pp., illust. \$11.50. Saunders, Phila.; McAinsh, Toronto, 1944.

The third edition of this monumental volume on Syphilis has now appeared. Although two new collaborators are associated with this work, it still retains the distinctive and inimitable style of the senior author.

The book has to a great extent been rewritten. The chapter on congenital syphilis has been expanded and rewritten. Extended space has been devoted to the biological false-positive reaction. Two new chapters have been added, one on penicillin and another on syphilis in public health and military medicine. The writers appear to have gone overboard in their enthusiasm for penicillin. In view of the shortness of the period of observation the statement "the King is dead, long live the King" would appear premature. In view of the simplicity and safety of



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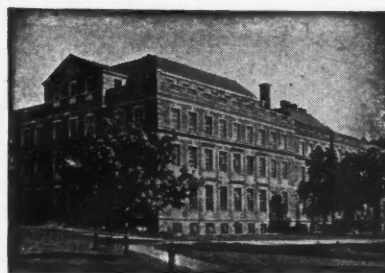
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treatment with penicillin, one can only hope that the early promise of this drug be upheld.

The authors have devoted much space to the shortened forms of arsenotherapy, the various methods being described in detail. Eagle's fundamental work on the safety and curative dose of arsenic is also discussed. Although stress is laid on the dangers of massive arsenotherapy, it is nice to note that shortened forms of therapy are at last coming into their own. A chapter is also devoted to the public health aspects of the disease. The present war has brought about a tremendous impetus to the realization that syphilis is a major health problem.

The authors and their co-workers are entitled to a great deal of credit for producing in these times such a readable masterpiece on a most important disease. It is a "must" book for every student or specialist in the handling of syphilis.

**Structure and Function as Seen in the Foot.** F. W. Jones, Professor of Anatomy, University of Manchester. 329 pp., illust. \$7.50. Baillière, Tindall & Cox, London; Macmillan, Toronto, 1944.

To the comparative anatomist and to the clinician the lessons to be learned from a study of the foot cannot be overstressed, and beyond doubt Wood Jones has taken us far toward an understanding of the relationship between its structure and function. His approach is iconoclastic, for lucidly and indisputably he disposes of the common concept that the foot is a hand made over, in a rather makeshift manner, for orthograde progression. In contrast to the usual static description of the pes as a "poor relation" of the hand, he describes it as a highly specialized member, characteristically human, tending toward perfection in its adaptation for supporting the moving body. He destroys the idea that the muscles in the sole are mere vestiges of a once nobler state similar to that in the hand. They have not degenerated, but have advanced and specialized towards meeting the newer needs of the body, and are integral parts of the foot mechanism. The foot is not merely an inert base but according to this author is rather a highly complex spring on which the body may rest or move.

An understanding and acceptance of these principles should go far towards modifying the present treatment of foot disorders. The theory advanced for the cause of march fracture is probably the simplest and most logical yet propounded. The anatomical descriptions are precise, authoritative and clear cut. The figures drawn by the author perhaps lack the polish of the finished artist, but they are excellent illustrations of the points described. This book is highly recommended to medical students, and should be read by any practitioner who would attempt to treat foot disorders rationally.

**Anatomy and Physiology for Students of Physiotherapy, Occupational Therapy and Gymnastics.** C. F. V. Smout, Senior Lecturer and Acting Professor, Department of Anatomy, University of Birmingham, and R. J. S. McDowell, Professor of Physiology, University of London. 418 pp., illust. \$9.00. Arnold, London; Macmillan, Toronto, 1944.

This book is eminently suited to its purpose. It is a short concise textbook of anatomy and physiology dealing with those parts of anatomy which are of importance to physiotherapy and occupational therapy students and workers. The illustrations are excellent. There is an extensive discussion of the osseous, muscular and nervous system anatomy.

The physiology is a little sketchy in places, most noticeably in the description of the various tracts of the spinal cord in relation to motor and sensory function. Apart from this minor defect the book may be strongly recommended to all physiotherapy workers both students and graduates.

**Plaster of Paris Technique.** E. O. Geckeler, Associate Professor of Orthopaedic Surgery and Chief of Fracture Service, Hahnemann Medical College and Hospital, Philadelphia. 220 pp., illust. \$3.75. Williams and Wilkins, Baltimore; University of Toronto Press, 1944.

The value of this book is perhaps best appreciated by senior surgeons who acquired their mastery of plaster of Paris technique through trial and error methods thirty or more years ago. In these days, the technician in the fracture room is usually much more skillful in the application of plaster than is the resident or intern. The curriculum is so full that students are given little instruction in the art of bandaging or the preparation and handling of plaster dressings.

This book fills a need and it is recommended heartily. The illustrations alone would be instructive. It may be gratuitous to suggest that it is presupposed that apparatus and hospital facilities are always available to the surgeon using plaster of Paris. The days of improvisation have not passed completely and a few hints as to procedure when a special table is not available might be valuable.

**Foster Home Care for Mental Patients.** H. B. Crutcher, Director of Social Work, State of New York Department of Mental Hygiene. 199 pp. \$2.00. Commonwealth Fund, New York, 1944.

This book presents in relatively small compass the history and results of family care for mentally ill patients, as practised in Europe, the United States and Canada. Unfortunately the author does not give, except in one or two instances, the population of the institutions from which patients have been selected to be placed in family care. The figures given look large to a reader who has no idea of the enormous size of many of our mental hospitals.

The writer implies that this procedure if practised universally and over a long period of years would materially reduce not only the expenses of taking care of the insane and feeble minded element of our population but also the actual numbers in our hospitals.

As regards expense, the average amount of \$8.00 per week as board is about the average cost per hospital patient week; but there is a failure to point out that the type of patient put out to board does not cost the hospital anywhere near this amount, in other words it is the violent destructive patient and the recoverable patient requiring both physical and mental treatment expensive and complicated in nature who are responsible for most of the supervisory costs and these costs are at least half of any institutional expense.

The numbers in hospital are of course decreased but the percentage of decrease is small except possibly among the feeble minded element; the same money spent in the institution on intensive vocational and rehabilitation programs might accomplish an equally good result.

One other point is brought out; patients' relatives are often too much like the patient to be fit persons to receive them on their return from an institution. This contention has merit, but we should not forget that many families will be very prone to escape their responsibilities unless this system is very carefully controlled.

**Electrotherapy with the Direct and Low Frequency Currents.** E. B. Clayton, Director of Physical Treatment Department, King's College Hospital, London. 271 pp., illust. \$3.00. Baillière, Tindall and Cox, London; Macmillan, Toronto, 1944.

This book while containing all the essentials of electrotherapy with direct and low frequency currents does not deal with any high frequency work at all. This is a serious defect from the point of view of the physician. It is a text suitable for use in schools training physiotherapy technicians but cannot be recommended for medical students as it is too limited in the field covered.

